

## Regular Article

# Psychological effects of aromatherapy on chronic hemodialysis patients

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### Abstract

Effects of aromatherapy (odorless condition, lavender, and hiba oil) on mood and anxiety were investigated in 14 female patients who were being treated with chronic hemodialysis. A control period consisting of natural hospital smells was established before each test session, and then aromatic test conditions were systematically evaluated for odorless conditions as well as aromatic conditions containing lavender and hiba oil aromas. The effects of aromatherapy were measured using the Hamilton rating scale for depression (HAMD) and the Hamilton rating scale for anxiety (HAMA). Hiba oil aroma significantly decreased the mean scores of HAMD and HAMA, and lavender aroma significantly decreased the mean scores of HAMA. The mean scores of HAMD and HAMA in an odorless condition were not significantly different from those of the control conditions. These results indicate that in chronic hemodialysis patients hiba oil is an effective, non-invasive means for the treatment of depression and anxiety, and that lavender alleviates anxiety.

### Key words

anxiety, aromatherapy, chronic hemodialysis, depression, hiba oil, lavender.

## INTRODUCTION

Psychological problems have been observed in hemodialysis patients with chronic renal failure because of being compelled to follow a dialysis schedule for a long period of time.<sup>1,2</sup> Specifically, depression and anxiety are so frequently observed that psychological management is required for most dialysis patients and, in many cases, the use of antidepressants or anxiolytic agents is also needed.<sup>3</sup> Fragrance has long been known to have beneficial psychological and physiological effects on humans.<sup>4,5</sup> A clinical study has shown that fragrance influences human mood and has an antidepressant effect in depressed patients.<sup>6</sup> The purpose of this study was to investigate the psychological effects of aromatherapy on depression and anxiety in chronic hemodialysis inpatients, and to determine whether or not aro-

mathotherapy can be utilized in clinical settings. Odorless conditions were also studied in order to assess how the usual smells in the hospital bedrooms, which are at times distinctly unpleasant, influenced the psychological state of hemodialysis patients.

## SUBJECTS AND METHODS

### Subjects

Fourteen female inpatients with chronic renal failure were selected to participate in this study after being fully informed of the study purpose and after giving informed consent to participate in this study. All 14 inpatients included in this study met the criteria for mild to severe depression according to a baseline Hamilton rating scale for depression (HAMD) with a minimal total score of 7.<sup>7</sup> All of the patients were hospitalized for hemodialysis in Hirosaki Hospital's Oyokyo Kidney Research Institute, and all of them had been undergoing hemodialysis since before August 1997. The patients' characteristics and background factors are shown in Table 1, and the patients' medical complications are specified in Table 2. The

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**Table 1.** Characteristics of subjects

Case <i>n</i>	Age (years)	Y-G test	CMI (area)	Duration of hospitalization	Duration of hemodialysis	Classification of duration (Phase)	Psychiatric drugs
1	48	A B	III	4 M	2 Y	6	Clotiazepam 20 mg
2	58	A B	IV	1 Y, 6 M	1 Y, 6 M	5	
3	62	B'	IV	3 Y	3 Y, 3 M	6	Triazolam 0.25 mg
4	69	A	IV	3 M	7 M	4	Etizolam 1 mg
5	71	D	IV	7 M	7 M	4	
6	71	D'	II	3 M	4 Y, 6 M	6	
7	76	D	III	5 M	5 M	4	Alprazolam 0.4 mg
8	76	A''	II	9 M	7 M	4	
9	79	D	II	3 Y, 9 M	9 Y	6	
10	80	D	III	1 Y, 2 M	2 Y, 4 M	5	
11	40	A''	IV	8 M	19 Y	6	Clonazepam 1 mg Flunitrazepam 2 mg
12	50	A''	IV	3 M	2 M	3	Triazolam 0.25 mg
13	63	C	II	5 M	7 M	4	
14	73	A B	IV	2 Y, 6 M	2 Y, 6 M	5	Triazolam 0.25 mg

Y-G test, Yatabe-Gilford test; CMI test, Cornell Medical Index test; Phase, Haruki's classification; Y, year; M, month; W, week.

**Table 2.** Complications observed in the subjects

Case <i>n</i>	Complications
1	Facial nerve palsy Osteoporosis (coccygeal bone fracture)
2	Diabetes mellitus, diabetic cataract (IOL) Cerebral infarction (for 1 Y, 8 M), cerebellar infarction
3	Cerebral infarction (left hemiparesis for 17 Y)
4	Lumbago by recurrence of bladder cancer treated with morphine
5	Chronic thyroiditis, diabetes mellitus Stenosis of right visual area (bilateral occlusion of retinal vein) Pleural effusion (due to renal failure)
6	Diabetes mellitus, diabetic gangrene
7	Cerebral infarction (right hemiparesis)
8	Osteoporosis (lumbago)
9	Cataract Osteoporosis (pelvic fracture) Lumbar canal stenosis
10	Diabetes mellitus, sick sinus syndrome (use of pacemaker)
11	Bilateral femoral bone fracture Right carpal tunnel syndrome Digestive tract hemorrhage
12	Hypertension, left renal cancer
13	Osteoarthritis
14	Diabetes mellitus, chronic thyroiditis

Y, year; M, month; IOL, intra-ocular lens.

**Table 3.** Study design

Week	Condition	Assessments
1	Control condition (natural smells)	HAMD, HAMA CMI test, Y-G test
2	Odorless condition (Epolion N-200)	HAMD, HAMA
3	Control condition (natural smells)	HAMD, HAMA
4	Aromatic condition (lavender oil)	HAMD, HAMA
5	Control condition (natural smells)	HAMD, HAMA
6	Aromatic condition (hiba oil)	HAMD, HAMA

HAMD, Hamilton rating scale for depression; HAMA, Hamilton rating scale for anxiety; CMI test, Cornell Medical Index test; Y-G test, Yatabe-Gilford test.

patients' ages ranged from 40 to 80 years with a mean age ( $\pm$ SD) of 65.4 ( $\pm$ 12.4) years. The mean duration of hemodialysis in months ( $\pm$ SD) was 33.1 ( $\pm$ 58.2). Subjects were allocated into six subgroups by Haruki's classification.<sup>8</sup>

## Methods

Table 3 shows the study design. The smells in the patients' rooms were changed at 1 week intervals from control conditions (natural smell) to odorless conditions using Epolion N-200 (Epolion Co. Ltd, Tokyo, Japan), from control conditions to aromatic

conditions using lavender (Kobayashi Pharm. Co. Ltd, Tokyo, Japan), and from control conditions to aromatic condition using hiba oil (Aomori Forest Association, Aomori). The psychological status of the patients was assessed each week by trained evaluators from 10:00 to 11:30 am on the day following hemodialysis. Three psychiatrists, a clinical psychologist, two nurses and a case worker, each of whom had been trained to perform the standardized assessments, assessed the degree of depression and anxiety with the HAMD<sup>7</sup> and Hamilton rating scale for anxiety (HAMA)<sup>9</sup> on the last day of each week. During the first week of the study, the psychological status and character of the subjects were assessed by Cornell Medical Index (CMI) test and Yatabe–Gilford test (Y–G test), respectively.<sup>10</sup> Odorless conditions were made by spraying an odorless agent (Epolion N-200) in the room twice a day during the week. The aromatic condition was maintained by lavender or hiba oil using an aroma pot throughout the week. No psychiatric drugs were administered except for cases No. 1, 3, 4, 7, 11, 12 and 14. Of these seven cases, six patients had been given triazolam, etizolam, alprazolam, flunitrazepam or clonazepam at bedtime as a hypnotic, and one patient was taking clonazepam. All of these tranquilizer treatments were kept at a constant dosage throughout the study periods. None of the remaining patients were given any medication that could affect the patient's mood or anxiety.

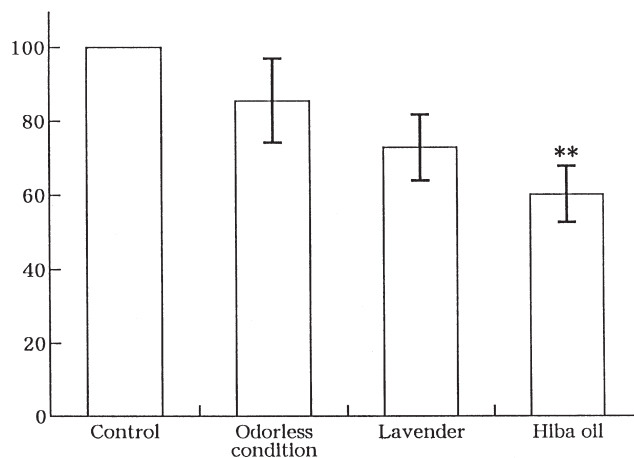
Statistical analyses were performed using MANOVA (multiple variate analysis of variance) and Tukey's test. The study protocol was approved by the Ethics Committee of Hirosaki University Hospital.

## RESULTS

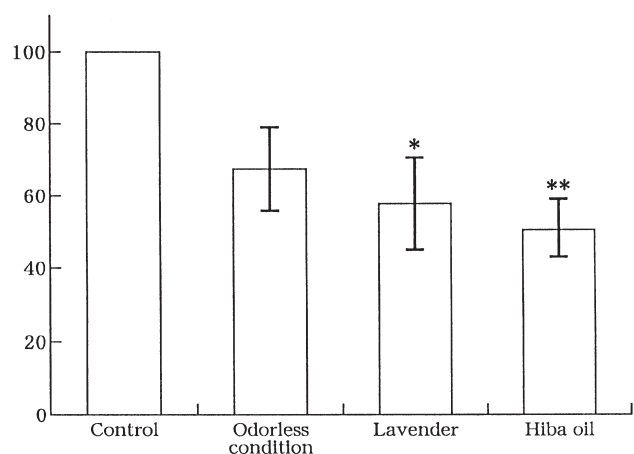
### Effects of fragrance on mood assessed by the Hamilton rating scale for depression

The changes in the mean HAMD score (mean  $\pm$  SE) are shown in Fig. 1. The mean score of HAMD ( $\pm$  SE) during the 1st week of control conditions was 20.57 ( $\pm$ 1.98) ( $n=14$ ). The mean scores decreased from control condition during each test week as follows: odorless condition 17.36 ( $\pm$ 2.96), lavender 15.29 ( $\pm$ 2.59) and hiba 12.57 ( $\pm$ 2.13). The corresponding percentage improvement for each test week compared with the control was: odorless condition 85.5% ( $\pm$ 11.4), lavender 72.8% ( $\pm$ 8.9) and hiba 60.2% ( $\pm$ 7.5).

The mean scores of HAMD in the odorless and in both aromatic conditions were slightly smaller than those in the control conditions, but a significant difference was obtained only in the hiba oil aromatic condition ( $F$  value = 4.41;  $P=0.008$ ).



**Figure 1.** Effects of fragrance on Hamilton rating scale for depression (HAMD) scores. Each bar represents percent improvements of HAMD scores (mean  $\pm$  SE) of 14 subjects. \*\* $P < 0.01$  (significant difference from control by Tukey's test).



**Figure 2.** Effects of fragrance on Hamilton rating scale for anxiety (HAMA) scores. Each bar represents percent improvements of HAMA scores (mean  $\pm$  SE) of 14 subjects. \* $P < 0.05$ ; \*\* $P < 0.01$  (significant difference from control by Tukey's test).

### Effects of fragrance on anxiety assessed by the Hamilton rating scale for anxiety

The changes in the mean score of HAMA (mean  $\pm$  SE) are shown in Fig. 2. The mean score of HAMA ( $\pm$  SE) during the 1st week of control conditions was 18.07 ( $\pm$ 2.20;  $n=14$ ). The mean scores decreased from control condition during each test week as follows: odorless condition 12.36 ( $\pm$ 2.69), lavender 11.43 ( $\pm$ 3.15) and hiba 9.93 ( $\pm$ 2.96). The corresponding percentage

improvement for each test week compared with the control was: odorless condition 67.4% ( $\pm 11.6$ ), lavender 57.7% ( $\pm 12.8$ ) and hiba 50.4% ( $\pm 8.6$ ).

The mean scores of HAMA in the odorless condition and in both aromatic conditions were slightly smaller than those in the control conditions, and significant differences were obtained in the hiba oil and lavender aromatic conditions ( $F$  value = 5.15;  $P = 0.003$ ).

### **Effects of character traits, the area of Cornell Medical Index test, and the duration of hemodialysis on the scores of HAMD and HAMA**

Character traits, as determined by Y-G test and the area of CMI test during the pretest period did not show any effect upon the scores of HAMD and HAMA during testing under lavender and hiba oil conditions. However, odorless conditions significantly decreased only HAMD score in the area III group of the CMI test. Area I of the CMI test represents a normal state, area II an almost normal state, area III a borderline neurotic state, and area IV a neurotic state. The corresponding percentage improvement in the odorless condition compared with the control was as follows: the area II group of the CMI test (four patients) = 86.3% ( $\pm 19.8$ ); the area III group (three patients) = 30.7% ( $\pm 8.2$ ); and the area IV group (seven patients) = 108.6% ( $\pm 11.4$ ).

All cases were classified by the duration of hemodialysis according to Haruki's classification.<sup>8</sup> One patient was allocated to the 3rd phase (1M-4M), five patients to the 4th phase (4M-1Y), three patients to the 5th phase (1Y-3Y), and five patients to the 6th phase (<3Y).

There was no significant correlation between the duration of hemodialysis and the improvement of HAMD or HAMA scores.

## **DISCUSSION**

The mechanism of action of fragrance on psychological status has not yet been clarified but the effect of fragrance has long been known to have stimulating and sedative effects.<sup>4</sup> A study of contingent negative variation (CNV) revealed that lavender had a sedative effect and hiba oil had a stimulating effect on the central nervous system.<sup>11,12</sup>

It is reasonable, therefore, to expect that fragrance may have antidepressant and anxiolytic effects. This study revealed that hiba oil, which has a stimulating effect, showed antidepressant and anxiolytic effects, and that lavender showed anxiolytic effects. The

scores of HAMD and HAMA were slightly decreased by odorless conditions but failed to reach a statistically significant level. Further study with a larger number of patients is needed in order to determine how the usual smell in hospital bedrooms and odorless conditions affect patients' psychological status.

The patient's initial experience with hemodialysis is influenced by the severity and chronicity of illness, as well as by patient expectation for the treatment and technical factors of the treatment. Those with slowly progressive chronic illnesses may dread the loss of autonomy associated with 'the machine'. Although the relief following initiation onto dialysis allows for a so-called honeymoon period, most patients have to face various complications that are inevitably associated with chronic hemodialysis. Patients with systemic diseases such as diabetes mellitus (DM) and hypertension tend to tolerate dialysis less well than patients with primary disease of the kidneys. Various coexisting diseases in hemodialysis patients such as pain due to osteoporosis or cancer and fear of further visual loss due to DM, seen in the present study, have been reported to be associated with deteriorating psychological conditions that require psychiatric treatment.<sup>1</sup>

Poor physical condition interrupts intensive pharmacological therapy for psychological symptoms. In the present study, treatment of depression and anxiety was limited by side-effects of antidepressants and anxiolytics, by the degrees of renal dysfunction, and by the interaction between these drugs and drugs necessary for physical symptoms. Only hiba oil showed both antidepressant and anxiolytic effects, and lavender showed anxiolytic effects. Moreover, Hiba oil and lavender did not result in irritative stimulation for the patients. Thus, aromatherapy is thought to bring favorable psychological effects to renal failure patients without the side-effects associated with pharmacotherapy.

Character traits, as determined by Y-G test during the pretest period, did not show any effect upon the scores of HAMD and HAMA during testing with odorless, lavender and hiba oil conditions. Only odorless conditions significantly decreased the HAMD score of patients allocated to area III of the CMI test. The results of this study indicate no significant effects of odorless conditions for cases in area IV of the CMI test. However, the number of cases in area III was small ( $n=3$ ). Further study is needed with a larger number of subjects in order to assess the effects of character trait, psychological status before the introduction of hemodialysis, the duration of hemodialysis therapy on the effectiveness of aromatherapy, and the interaction between background

factors such as character trait and psychological status of patients before introduction of hemodialysis.

For the establishment of aromatherapy in the treatment of chronic renal failure patients with psychological problems, the selection of aromas as well as the duration, timing and intensity of exposure to aromas should also be studied in the future. This is because patients experience differences in the taste and intensity of aromas.

In summary, this study indicates that hiba oil has both antidepressant and anti-anxiety effects in chronic hemodialysis patients while lavender has anxiolytic effects in such patients regardless of the presence of physical complications.

## REFERENCES

1. Kaneko S, Sato T, Hirayama N *et al.* Psychiatric complication with chronic hemodialysis – importance of psychological and social care. *Seishin Shinkeigaku Zasshi [J Psychiatry Neurol.]*, 1986; **40**: 559–570.
2. Haruki S. Depression and anxiety in hemodialysis patients. **In:** Haruki S (ed.) *Sharing Dialysis*. Japanese Medical Center, Tokyo, 1994: 53–70 (in Japanese).
3. Kaneko S. Pharmacotherapy for psychiatric complications in chronic hemodialysis patients. **In:** Haruki S. (ed.) *Sharing Dialysis*. Japanese Medical Center, Tokyo, 1994: 91–105 (in Japanese).
4. Rovesti P, Colombo E. Aromatherapy and aerosol. *Soap Perfumery and Cosmetics* 1973; **46**: 475–477.
5. Manley CH. Psychophysical effect of odor. *Clin. Rev. Food Nutr.* 1993; **33**: 57–62.
6. Komori T, Fujiwara R, Tanida M, Nomura J. Application of fragrance to treatments for depression. *Nihon Shinkei Seishin Yakurigaku Zasshi [Jpn. J. Psychopharmacol.]* 1995; **15**: 39–42 (in Japanese with English abstract).
7. Schutte NS, Malouff JM. *Hamilton Depression Rating Scale: Source Book Of Adult Assessment Strategies*. 1995; 127–134.
8. Haruki S. Psychiatric aspects of chronic hemodialysis. **In:** Oota K, Sugino N, Haruki S (eds). *Dialysis Patients In Clinical Practice* (in Japanese). Nankodo, Tokyo, 1979; 151–209.
9. Schutte NS, Malouff JM. *Hamilton Anxiety Rating Scale: Source Book Of Adult Assessment Strategies*. 1995; 154–160.
10. Tsujioka B, Yatabe T, Sonohara T. A factorial study of the temperament of Japanese college male students by the Yatabe-Gilford personality inventory. *Psychologia* 1957; **1**: 110–119.
11. Fukuda H, Torii S, Kanemoto H, Takino R, Miyauti T, Hamanabe Y. Effects of odors on contingent negative variation (CNV) (in Japanese). *Proceedings of the 19th Japanese Symposium on Taste and Smell*. Takasago Perfume Industry, Takasago, 1985, 65–68.
12. Hiruma T, Yabe H, Sato Y *et al.* Different effects of the hiba odor on CNV and MMN. *Brain Res. Cogn. Brain Res.* 2000 (in press).