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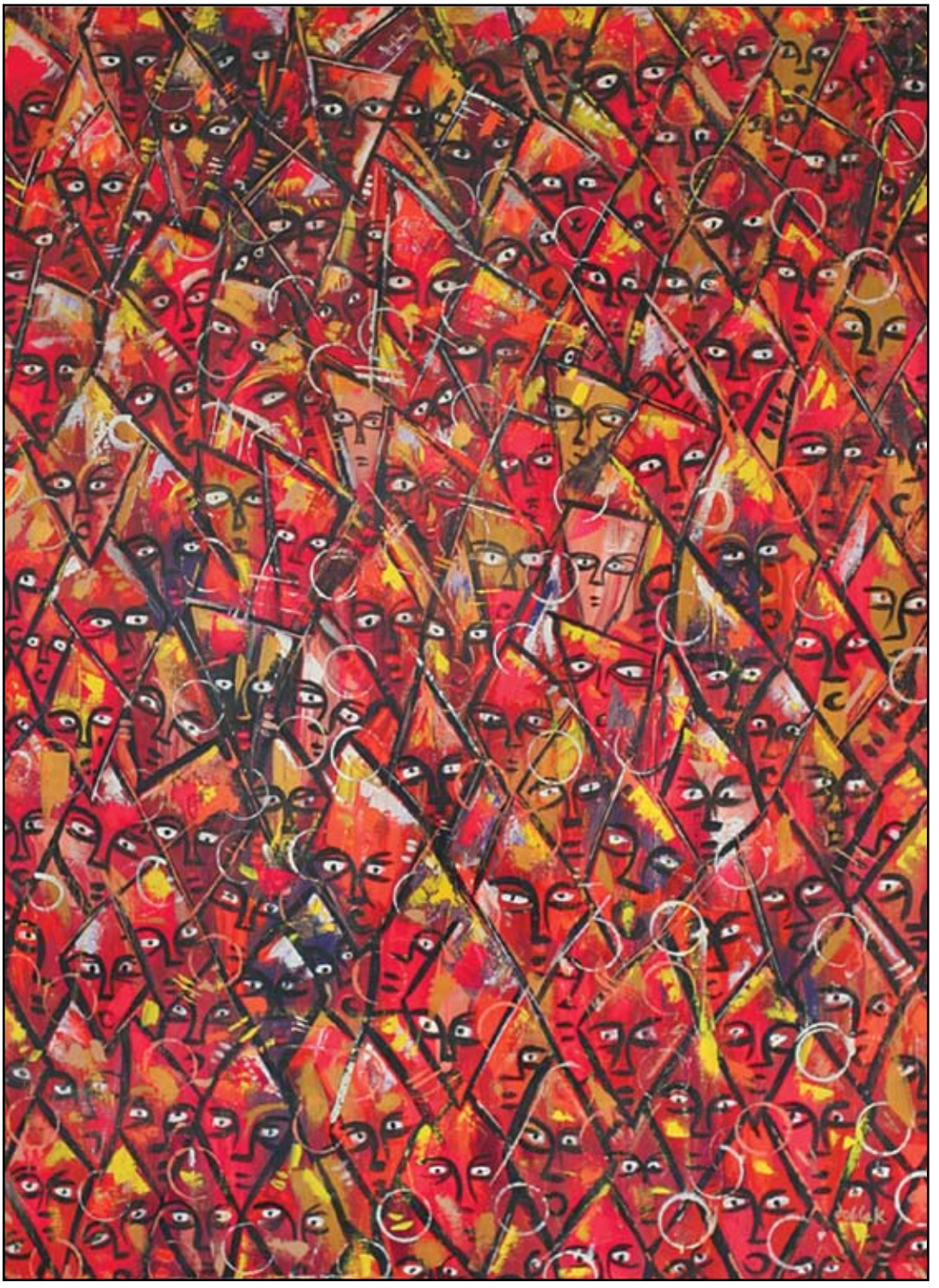

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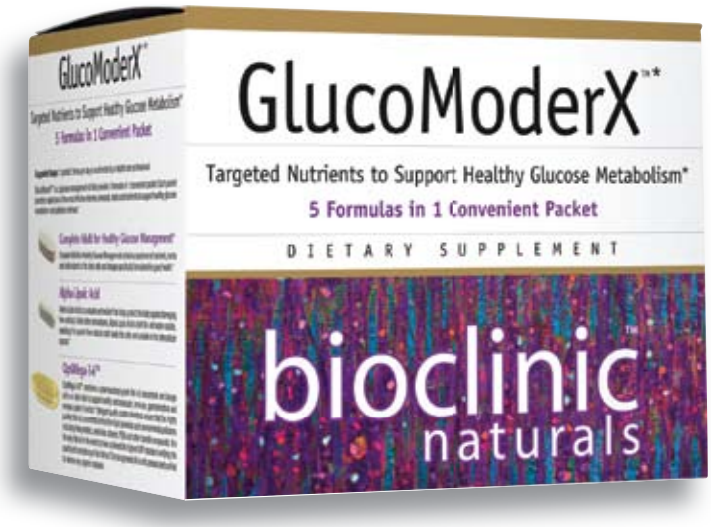

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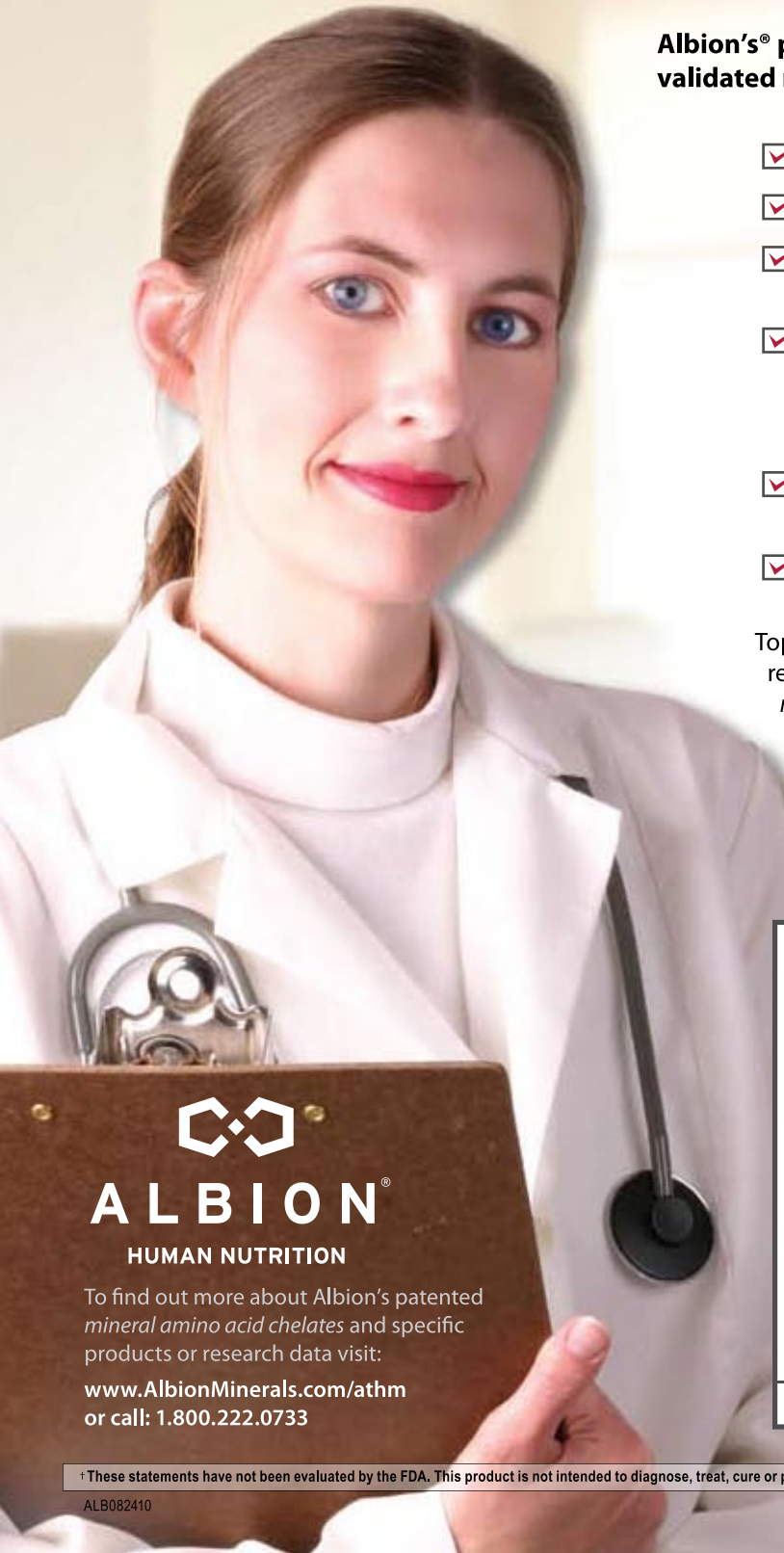

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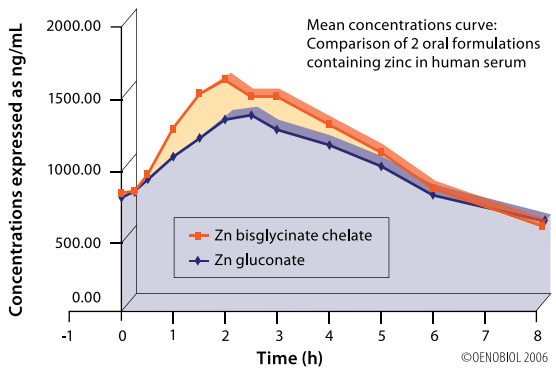

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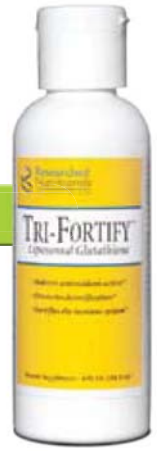

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ABOUT THE COVER

Eyes gaze forth from diamonds and triangles as Joseph Adibleku explores the inherent value of all human life. "The numerous faces symbolize the fact that even though we are all of diverse backgrounds, socializations, values and thinking patterns, we can learn to accommodate each other perfectly to form a beautiful picture. Everyone, no matter where he or she is coming from, is equally important," the artist says.

Unity. Acrylic on canvas, 44.5" W x 53.9" H, Joseph Adibleku.

ALTERNATIVE THERAPIES IN HEALTH AND MEDICINE (ISSN 1078-6791) is published bimonthly (January, March, May, July, September, November) by InnoVision Professional Media, 1408 Northland Drive, Suite 306, Mendota Heights, MN, Tel: (877) 904-7951, Fax: (651) 344-0774. E-mail: ATHM@innovisionhm.com. *Alternative Therapies in Health and Medicine* is indexed in *Index Medicus, CINAHL, Science Citation Index-Expanded (SciSearch®), ISI (Institute for Scientific Information) Alerting Services, Current Contents®/Clinical Medicine, EMBASE (Excerpta Medica),* and MEDLINE.

For subscription questions please call toll-free: US only, (877) 904-7951; outside the US, (651) 251-9684. Annual individual subscriptions: US and possessions: $68; foreign: $97 (US). Institutional rates: US: $171; foreign: $237 (US). Single copies: US: $12; all other countries: $18 (US). Periodical postage paid at St Paul MN, and additional mailing offices. Postmaster: Send address changes to ALTERNATIVE THERAPIES, PO Box 11292, St Paul, MN 55111. Allow 4 to 6 weeks for change to take effect. The name and title ALTERNATIVE THERAPIES IN HEALTH AND MEDICINE is protected through a trademark registration in the US Patent Office. Printed in the USA.

INNOVISION PROFESSIONAL MEDIA, INC.
1270 Eagan Industrial Road • Eagan, MN • Tel: (877) 904-7951• Fax: (651) 344-0774 • Web: www.alternative-therapies.com

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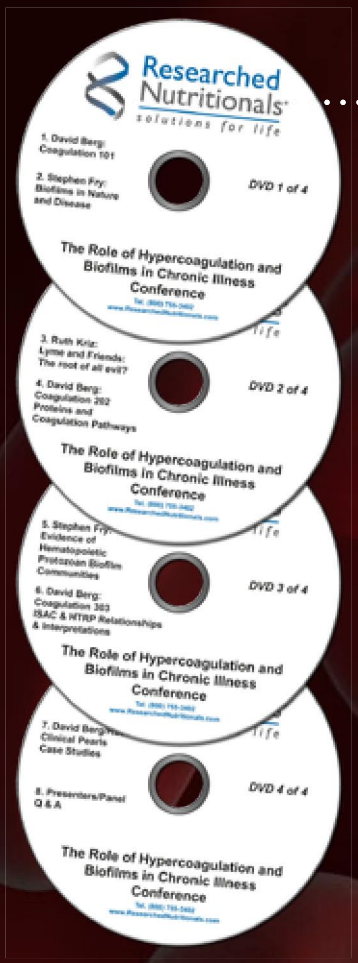

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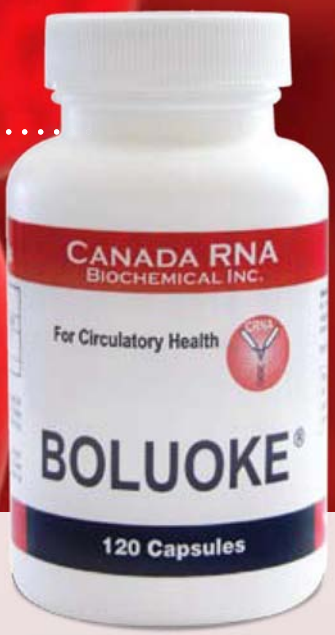

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Foot Reflexology Can Increase Vagal Modulation, Decrease Sympathetic Modulation, and Lower Blood Pressure in Healthy Subjects and Patients With Coronary Artery Disease

Wan-An Lu, MD, PhD; Gau-Yang Chen, MD, PhD; Cheng-Deng Kuo, MD, PhD

Objective • Complementary and alternative medicine (CAM) has long been used by people to postpone the aging process and to reverse disease progression. Reflexology is a CAM method that involves massage to reflex areas in the feet and hands. This study investigated the effect of foot reflexology (FR) on the autonomic nervous modulation in patients with coronary artery disease (CAD) by using heart rate variability analysis.

Study Methods • Seventeen people with angiographically patent coronary arteries and 20 patients with CAD scheduled for coronary artery bypass graft surgery were recruited as the control and CAD groups, respectively. The normalized high-frequency power (nHFP) was used as the index of vagal modulation and the normalized very low-frequency power (nVLFP) as the index of vagal withdrawal and renin-angiotensin modulation.

Results • In both control and CAD groups, the nHFP was increased significantly whereas the nVLFP was decreased significantly 30 and 60 minutes after FR, as compared with those before FR. The systolic, diastolic, mean arterial, and pulse pressures were significantly decreased after FR in both groups of participants. In the CAD group, the percentage change in heart rate 30 and 60 minutes after FR was smaller than that in the control, and the percentage change in nVLFP 60 minutes after FR was smaller than that in the control. In conclusion, a higher vagal modulation, lower sympathetic modulation, and lower blood pressure can be observed following 60 minutes of FR in both controls and CAD patients. The magnitude of change in the autonomic nervous modulation in CAD patients was slightly smaller than that in the controls.

Conclusion • FR may be used as an efficient adjunct to the therapeutic regimen to increase the vagal modulation and decrease blood pressure in both healthy people and CAD patients. (*Altern Ther Health Med.* 2011;17(4):8-14.)

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Age-related changes in autonomic nervous system control of the circulation are a key feature of age-associated cardiovascular disease.[1,2] Vagal modulation was found to be decreased in various physiological and pathological conditions, such as aging,[3] acute myocardial infarction,[4] diabetes mellitus,[5] chronic renal failure,[6] congestive heart failure,[7] and coronary artery disease (CAD).[8-12] In addition, the reduction in cardiac vagal modulation, as evaluated by spectral heart rate variability (HRV) analysis, correlated with angiographic severity, independent of previous myocardial infarction, location of diseased coronary arteries, and left ventricular function.[12] Vagal stimulation has been shown to have an antiarrhythmic effect in animal models of acute ischemia[13,14] and can terminate ventricular tachycardia in humans.[15] A pharmacological method of using transdermal scopolamine as a cardiac vagal enhancer was tried in patients with acute myocardial infarction[16-19] and congestive heart failure[20] and proved to be effective in improving the autonomic indices that are associated with high mortality. However, the safety, tolerability, and efficacy of long-term transdermal scopolamine treatment remain to be clarified.[21]

Complementary and alternative medicine (CAM) has long been used to postpone the aging process and to reverse disease progression. CAM therapies have lasted because in some cases they work as well as or better than allopathic medicine. With growing public interest in CAM, it is important for medical professionals to examine the effectiveness of CAM techniques. Among many therapeutic modalities, reflexology is often used as an antiaging CAM technique.[22]

Reflexology is a form of complementary medicine that involves using massage to reflex areas in the feet and the hands.[23-26] By stimulating and applying pressure to certain areas, one can increase blood

circulation and promote specific bodily and muscular functions. It has been estimated that more than 20 million Americans have seen reports of the effectiveness of reflexology on television and have read about this natural technique of healing in national magazines and newspapers.[23] Several books have been written to propagate the rejuvenation effects of reflexology.[24-26] Though Wang et al[27] reviewed five studies of reflexology in the literature and concluded that there is no evidence for any specific effect of reflexology in any conditions with the exception of urinary symptoms associated with multiple sclerosis, others have shown significant effects using reflexology. The feet are the most common areas treated with reflexology.[24] Sudmeier et al[28] showed that foot reflexology (FR) is effective in changing renal blood flow. Stephenson et al[29,30] have shown that FR can relieve pain in patients with metastatic cancer and decrease anxiety in patients with breast and lung cancer. Ergonomically created footwear also has been invented to provide relaxation, reduce swelling, induce blood flow, and rejuvenate the muscles and nerves in the ankle and foot area.[31]

Since patients with anxiety or pain are expected to have an elevated sympathetic and a depressed vagal modulation,[32,33] it is possible that treatment with FR can lower sympathetic modulation and raise vagal modulation. It is therefore worthy of investigating whether FR can have an effect on the autonomic nervous modulation in normal controls and in patients with CAD.

MATERIALS AND METHODS

Study Participants

Coronary arteriography was performed in patients with angina pectoris, unstable angina, previous myocardial infarction, or other evidence of myocardial ischemia. A panel of cardiologists interpreted the angiograms. The coronary arteries and branches were divided into 15 segments according to the Ad Hoc Committee for Grading of Coronary Artery Disease of the American Heart Association.[34] Only the luminal narrowing in the following segments was used in the final assessment: segment 1-3 for the right coronary artery, segments 6 and 7 for the left anterior descending branch, segments 11 and 12 for the circumflex branch, and segment 5 for the left main coronary artery. By confining the analysis to these segments alone, only those patients who had significant obstruction in the main epicardial coronary arteries were included in this study. Stenosis was considered to be significant if a luminal narrowing >50% was present. Patients without stenosis or with luminal narrowing <30% were classified as the control group. Coronary artery bypass graft surgery was suggested for patients who refused percutaneous coronary intervention or whose lesions were not suitable for it. Patients with CAD preparing for coronary artery bypass graft surgery were recruited as the study group. Patients with angiographically patent coronary arteries were recruited as the control group. Hypertension was defined as systolic blood pressure >140 mmHg or diastolic blood pressure >90 mmHg.[35] Hyperlipidemia was defined as total cholesterol >200 mg/dL or low density lipoprotein cholesterol >100 mg/dL.[36] Patients who had atrial fibrillation or coexisting valvular heart disease or were using class I antiarrhythmic medication were excluded from this study. All participants were requested to refrain from alcohol or caffeine ingestion 24 hours before the study. The hospital Institutional Review Board approved this study. The procedure was fully explained to the participants, and written informed consent was obtained from them before the study.

Equipment

The electrocardiogram (ECG) signals were recorded using a multichannel recorder (Biopac MP150 with 16 channels, MP150CE/UIM100C/ECG100C, BIOPAC Systems, Inc, Goleta, California) from conventional lead II, and blood pressure was measured by using a sphygmomanometer (Kenlu-model K-300 Sphygmomanometer, Di Tai Precision Ent Co Ltd, Kaohsiung City, Taiwan) on each participant lying in a supine position. The analog signals of ECG were transformed to digital signals by using an analog-to-digital converter with a sampling rate of 400 Hz. Systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial blood pressure (MABP), and pulse pressure (PP) were obtained from each participant before FR using the sphygmomanometer.

Study Protocol

Before FR, each participant rested in a supine position for 5 minutes, and then 10 minutes of continuous ECG signals and blood pressure data were recorded. After baseline ECG recording and blood pressure measurement, the participant received FR for 60 minutes. The ECG recording and blood pressure measurements were repeated 30 and 60 minutes after FR. All procedures were performed in a bright and quiet room with a room temperature of 24°C to 25°C and humidity of 54% to 55%.

FR was performed on participants lying in a comfortable supine position by a certified foot reflexologist from the Taiwan Association of Reflexology using the techniques of Father Josef's FR.[37] The reflexologist used the thumb and fingers to apply pressure to stimulate all reflex zones in both feet, which correspond to all organs, glands, and body parts. The technique of the thumb and fingers resembles a caterpillar-like action in reflexology.[38] Grapeseed oil is used during FR to prevent friction and possible discomfort because it is nonsticky and odorless and absorbs easily into the skin.[39,40]

Heart Rate Variability Analysis

R-wave–detecting software written with the help of Matlab R13 software (MathWorks Inc, Natick, Massachusetts) was used to identify the peaks of the R waves in the recorded ECG signals. The RR intervals (the time intervals between two consecutive R waves in the electrocardiogram, RRI) were then calculated after eliminating ectopic beats. If the percentage of ectopic beats was greater than 5%, then the participant was excluded from analysis. The last 512 stationary RRI were used for HRV analysis.

The mean, standard deviation (SD_{RR}) and coefficient of variation (CV_{RR}) of the 512 stationary RRI were calculated using a standard formula for each participant. The power spectra of RRI were obtained by means of fast Fourier transformation (Mathcad, Mathsoft Inc, Cambridge, Massachusetts). Direct current component was excluded before the calculation of the powers. The area under the curve of the spectral peaks within the range of 0.01-0.4 Hz, 0.01-0.04 Hz, 0.04-0.15 Hz, and 0.15-0.40 Hz were defined as the

total power (TP), very low–frequency power (VLFP), low-frequency power (LFP), and high-frequency power (HFP), respectively.

The Task Force of the European Society of Cardiology and the North American Society of Pacing Electrophysiology have suggested that the power within the frequency range of 0.04-0.4 Hz be used for the normalization of LFP and HFP.[41] Since this frequency range covers only the frequency ranges of LFP and HFP but not VLFP, it may not be suitable for the normalization of VLFP. Therefore, we used the power within the frequency range of 0.01-0.4 Hz, which covers the frequency ranges of VLFP, LFP, and HFP, to normalize VLFP, LFP, and HFP in this study. The normalized very low-frequency power (nVLFP = VLFP/TP) was then used as the index of vagal withdrawal, renin-angiotensin modulation, and thermoregulation[42-44]; the normalized low-frequency power (nLFP = LFP/TP) was used as the index of combined sympathetic and vagal modulation[45]; the normalized high-frequency power (nHFP = HFP/TP) was used as the index of vagal modulation; and the low-/high-frequency power ratio (LFP/HFP) was used as the index of sympathovagal balance.[46]

Statistical Analysis

Values of HRV and blood pressure measures were presented as median (25 percentile-75 percentile). Friedman repeated measures analysis of variance on ranks (SigmaStat statistical software, Jandel Scientific, San Rafael, California) was employed to compare the HRV and blood pressure measures among before FR, 30 minutes after FR, and 60 minutes after FR. Significant difference was further analyzed by pairwise comparison using the Student Newman–Keuls test. The Mann-Whitney rank sum test was employed to compare the HRV and blood pressure measures between CAD patients and controls.

To correct for baseline differences on the comparison of HRV and blood pressure measures between CAD patients and controls, the percentage changes in HRV and blood pressure measures in each participant 30 and 60 minutes after FR were calculated using the following formulas:

$$\%X_{30} = [(X30_{\text{min}} - X_{\text{before}})/(X_{\text{before}})] \times 100$$
$$\%X_{60} = [(X60_{\text{min}} - X_{\text{before}})/(X_{\text{before}})] \times 100,$$

where X represents the variable to be compared. The Mann-Whitney rank sum test was used to compare $\%X_{30}$ and $\%X_{60}$ between controls and patients with CAD. Wilcoxon signed rank test was employed to compare $\%X_{30}$ with $\%X_{60}$ in both controls and patients with CAD. A $P < .05$ was considered statistically significant.

RESULTS

General Characteristics

The percentage of deletion of ectopic beats due to atrial or ventricular arrhythmia was >5% in two patients in the CAD group and three participants in the control group. Thus, only 20 out of 22 patients in the CAD group and 17 out of 20 patients in the control group were included in the final statistical analysis. Table 1 shows the baseline characteristics of the control and CAD groups. There were 17 men and 3 women (between 52.5 and 66.0 years of age with an average of 62.0 years) in the CAD group and 15 men and 2 women (between 52.0 and 66.0 years of age with an average of 56.0 years) in the control group.

Effect of Foot Reflexology on Blood Pressure

TABLE 1 Baseline Characteristics of the Control and Coronary Artery Disease (CAD) Groups*

	Control Group (n = 17)	CAD Group (n = 20)	*P* value
Age (y)	56.0 (52.0-66.0)	62.0 (52.5-66.0)	NS
Gender (M/F)	15/2	17/3	NS
Body height (cm)	161.0 (156.0-164.3)	163.5 (157.0-173.0)	NS
Body weight (kg)	59.0 (51.5-70.3)	64.0 (58.3-74.5)	NS
BMI (m^2/kg)	22.2 (21.1-25.0)	24.1 (22.2-26.4)	NS
History			
Previous MI	0	4	NA
Hypertension	12	15	NS
Diabetes mellitus	6	7	NS
Hyperlipidemia	6	7	NS
Current smoker	7	11	NS
Medication			
Beta-blocker	10	15	NS
Calcium antagonist	11	17	NS
Nitrates	13	19	NS
ACE inhibitor	6	10	NS
ARB	1	3	NS
Digitalis	1	1	NS
Aspirin	12	18	NS
Clopidogrel	5	10	NS
Ticlopidine	2	4	NS
Clinical status			
One-vessel disease	0	8	NA
Two-vessel disease	0	8	NA
Three-vessel disease	0	4	NA
Left main disease	0	5	NA
Left ventrical aneurysm	0	4	NA

*Values are numbers of patients or medians (25-75 percentile).
Abbreviations: BMI, body mass index; ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; MI, myocardial infarction; NS, not significant ($P > .05$); NA, not assessed.

Table 2 shows the sequential changes in blood pressures after FR in both groups of participants. The SBP, DBP, and MABP decreased significantly after FR in both groups. The PP decreased 30 minutes after FR in both groups and elevated to pre-FR level 60 minutes after FR in the control group.

Table 3 shows the percentage changes in blood pressures after RF in both groups of participants. In the control group, the percentage decrease in SBP and PP 30 minutes after FR was larger than that 60 minutes after FR. In the CAD group, the percentage decrease in PP 30 minutes after FR was larger than that of 60 minutes after FR. No significant difference in the percentage change in blood pressures after FR was found between the two groups.

Effect of Foot Reflexology on Heart Rate Variability

Table 4 shows the effects of FR on the time and frequency domain HRV measures in patients with CAD and control group.

TABLE 2 Effect of Foot Reflexology (FR) on Blood Pressure*

	Before FR	30 Min After FR	60 Min After FR
Control group (n = 17)			
SBP (mmHg)	136.0 (129.8-141.8)	115.0 (109.8-123.3)‡	124.0 (114.0-133.5)‡§
DBP (mmHg)	75.0 (72.8-80.3)	67.0 (63.0-73.3)‡	67.0 (62.8-75.0)‡
MABP (mmHg)	95.0 (87.5-101.3)	83.0 (78.3-88.0)‡	84.0 (79.8-86.8)‡
PP (mmHg)	60.0 (54.3-65.0)	48.0 (45.5-52.3)‡	54.0 (47.8-61.3)§
CAD group (n = 20)			
SBP (mmHg)	153.5 (139.5-163.5)†	134.5 (123.0-148.0)†‡	134.0 (125.5-147.0)†‡
DBP (mmHg)	84.5 (78.0-93.0)†	80.5 (70.5-84.5)†	75.5 (69.5-85.0)†‡
MABP (mmHg)	102.0 (95.5-113.0)†	96.5 (88.5-104.0)†	94.0 (85.0-99.0)†‡
PP (mmHg)	64.0 (60.0-72.0)	50.5 (46.5-66.5)‡	57.0 (53.0-64.0)‡

*Values presented are medians (25-75 percentile).
†$P < .05$ between controls and patients with CAD.
‡$P < .05$ vs before FR.
§$P < .05$ vs 30 min after FR.
Abbreviations: CAD, coronary artery disease; SBP, systolic blood pressure; DBP, diastolic blood pressure; MABP, mean arterial blood pressure; PP, pulse pressure.

TABLE 3 Percentage Changes in Blood Pressure After Foot Reflexology*

	%X30	%X60
Control group (n = 17)		
SBP; %	–15.2 (–18.5 to –8.3)	–8.3 (–12.5 to –2.8)†
DBP; %	–5.5 (–8.2 to –3.7)	–8.1 (–14.3 to –4.1)
MABP; %	–11.0 (–16.8 to –6.9)	–9.3 (–16.7 to –3.8)
PP; %	–15.9 (–26.7 to –10.8)	–8.5 (–16.1 to –1.2)†
CAD group (n = 20)		
SBP; %	–10.2 (–14.6 to –3.8)	–6.6 (–14.1 to –3.1)
DBP; %	–8.1 (–12.4 to 0.0)	–8.1 (–9.7 to –4.4)
MABP; %	–5.6 (–14.0 to –0.1)	–7.3 (–12.5 to –4.1)
PP; %	–13.5 (–23.7 to –5.3)	–9.1 (–16.7 to 1.7)†

*Values presented are medians (25-75 percentile).
†$P < .05$ vs $\%X_{30}$.
Abbreviations: CAD, coronary artery disease; SBP, systolic blood pressure; DBP, diastolic blood pressure; MABP, mean arterial blood pressure; PP, pulse pressure.

Thirty and 60 minutes after RF, the nHFP was significantly increased, whereas the nVLFP was significantly decreased in both groups of participants s as compared with those before RF. The VLFP and TP after FR were significantly decreased in the control group. The mean RRI was significantly increased, and the heart rate was significantly decreased after RF in CAD patients. Although the SD_{RR}, TP, VLFP, LFP, and HFP of the CAD patients before FR were not significantly different from those of the controls, they were significantly larger than those of the controls 60 minutes after FR. However, the relative HRV measures including nVLFP, nLFP, nHFP and LFP/HFP were not significantly different between the controls and the CAD patients both before FR and 60 minutes after FR.

Table 5 shows the percentage changes in HRV measures after RF in both groups of participants. The percentage decrease in SD_{RR}, TP, VLFP, and LFP and the percentage increase in heart rate 60 minutes after FR were larger than those of 30 minutes after FR in controls. There were no significant differences in the percentage changes in all HRV measures between 30 minutes and 60 minutes after FR in the CAD patients.

The percentage increase in mean RRI 30 minutes after FR in the CAD group was larger than that in the control group, whereas the percentage decrease in heart rate 30 minutes after FR in the CAD group was smaller than that in the control group. Similarly, the percentage increase in mean RRI, SD_{RR}, TP, VLFP, LFP, and HFP in the CAD group 60 minutes after FR was larger than those in the control group, whereas the percentage decrease in heart rate and nLFP in the CAD group 60 minutes after FR was smaller than those in the control group.

Effect of Beta-blockers on Heart Rate Variability

Table 6 shows that there were no significant differences in all HRV measures between participants using or not using beta-blockers in either control or CAD group and between the control and CAD groups whether they were using beta-blockers or not. There are no differences in the effects of FR on patients whether they were using or not using beta-blocker medication.

DISCUSSION

Ludwig has defined aging as a time-dependent, irreversible shift from environmental to intrinsic causation of disease.[47] This intrinsic pathogenesis has two components: the first one is genetic and beyond the reach of contemporary health care and the second one entails the growing number of degenerative lesions due to viral agents as well as carcinogenesis. Bonnemeier et al have shown that normal aging is associated with a constant decline of cardiac vagal modulation due to a significant decrease of nocturnal parasympathetic activity.[48] It has also been shown that depressed vagal modulation is associated increased risk of sudden death in patients with CAD, and the experimental evidence also suggests a causal relationship.[49-52] With the adverse prognostic implication of reduced cardiac vagal activity in its susceptibility to life-threatening arrhythmia,[51-53] any intervention that can enhance the vagal modulation will be beneficial to patients, especially for those at high risk for life-threatening arrhythmia. Exercise and medication have been found to increase the vagal modulation of the study participants,[16-20,53-55,

TABLE 4 Effect of Foot Reflexology (FR) on Heart Rate Variability Measures (HRV)*

	Before FR	30 Min After FR	60 Min After FR
Control group (n = 17)			
Mean RRI (ms)	861.9 (781.3-948.7)	839.5 (776.0-981.0)	827.0 (765.7-921.6)
Heart rate (bpm)	69.6 (63.2-76.8)	71.5 (61.2-77.3)	72.6 (65.1-78.4)
SD_{RR} (ms)	52.3 (48.5-60.3)	48.1 (45.6-57.7)	44.8 (42.3-49.5)
CV_{RR} (%)	6.0 (5.4-6.6)	5.9 (5.4-6.4)	5.4 (5.3-6.0)
TP (ms^2)	946 (784-1428)	808 (642-1242)	640 (552-866)‡§
VLFP (ms^2)	312 (186-497)	226 (135-385)‡	135 (106-179)‡§
LFP (ms^2)	251 (172-406)	206 (152-390)	188 (153-276)
HFP (ms^2)	369 (311-547)	390 (286-532)	344 (268-428)
nVLFP (nu)	33.1 (28.4-41.9)	27.8 (19.0-33.8)‡	20.2 (14.5-26.1)‡
nLFP (nu)	28.3 (20.5-29.4)	26.9 (23.7-29.0)	29.0 (25.6-32.5)
nHFP (nu)	38.6 (33.4-46.2)	47.2 (40.9-55.0)‡	50.7 (43.7-54.5)‡§
LFP/HFP	0.71 (0.53-0.82)	0.61 (0.51-0.66)	0.59 (0.49-0.67)
CAD group (n = 20)			
Mean RRI (ms)	831.1 (762.3-903.0)	917.5 (849.7-928.6)‡	911.0 (861.6-922.4)‡
Heart rate (bpm)	72.2 (66.5-78.7)	65.4 (64.6-70.6)‡	65.9 (65.1-69.6)‡
SD_{RR} (ms)	52.6 (45.2-62.5)	53.5 (49.4-66.6)	55.2 (49.6-60.7)†
CV_{RR} (%)	6.3 (5.5-7.2)	6.0 (5.5-7.1)	5.8 (5.4-6.5)
TP (ms^2)	981 (694-1526)	979 (886-1630)	1134 (931-1499)†
VLFP (ms^2)	257 (174-545)	233 (163-398)	212 (153-346)†
LFP (ms^2)	271 (208-491)	293 (278-407)	322 (259-449)†
HFP (ms^2)	470 (277-555)	515 (413-648)	527 (457-732)†
nVLFP (nu)	30.6 (24.9-32.9)	23.5 (17.7-29.0)‡	20.0 (14.2-29.0)‡
nLFP (nu)	28.4 (25.8-31.5)	29.2 (28.1-31.7)	29.5 (27.4-30.7)
nHFP (nu)	42.8 (34.8-46.3)	46.4 (40.9-50.9)‡	52.1 (42.9-55.4)‡
LFP/HFP	0.66 (0.53-0.83)	0.62 (0.52-0.77)	0.57 (0.52-0.66)

*Values presented are medians (25-75 percentile).
†$P < .05$ between normal controls and patients with CAD.
‡$P < .05$ vs before FR.
§$P < .05$ vs 30 min after FR.
Abbreviations: CAD, coronary artery disease; RRI, RR intervals; SD_{RR}, standard deviation of RR; CV_{RR}, coefficient of variation of RR; TP, total power; VLFP, very low-frequency power; LFP, low-frequency power; HFP, high-frequency power; nVLFP, normalized very low-frequency power; nLFP, normalized low-frequency power; nHFP, normalized high-frequency power; LFP/HFP, low-/high-frequency power ratio.

but this study showed that foot reflexology can also increase vagal modulation.

Reflexology is the study of working on the specific reflex points (areas) on the hands, feet, and ears that mirror the whole body in order to relax and relieve stress and pain.[23-26] In clinical terms, reflexology is the application of pressure, primarily but not limited to the feet, hands, or ears, that causes a physiological response in the body. Many studies have examined the efficacy of reflexology. However, controversy existed regarding efficacy of reflexology.[27,56-60] Frankel found that the frequency of sinus arrhythmia after reflexology and FM was increased by 43.9% and 34.1%, respectively; he suggested a "neuro theory" whereby reflexology and foot massage alter the baroreceptor reflex sensitivity by stimulating the sensory nervous system in the feet.[56] Hattan et al have investigated the impact of foot massage and guided relaxation on the well-being of patients who had undergone coronary artery bypass graft surgery and demonstrated that these interventions appear to be effective noninvasive techniques for promoting psychological well-being in this patient group.[57] Some studies have pointed out that reflexology possesses the potential to provide relief of pain and symptoms and induce relaxation.[25,58,59] Hayes and Cox[60] also demonstrated that a 5-minute foot massage had the potential effect of increasing relaxation as evidenced by a significant decrease in heart rate, blood pressure, and respiration during the brief foot massage intervention administered to critically ill patients in intensive care.

In this study, we found that FR results in positive effects on blood pressure and autonomic nervous modulation in both control group and patients with CAD. The nHFP was significantly increased after FR, whereas the nVLFP and LFP/HFP were significantly decreased after FR, in both control and CAD groups. This result suggested that a higher vagal modulation, lower sympathetic modulation, renin-angiotensin modulations and thermoregulatory activity can be observed following 60 minutes of FR in both angiographically patent controls and CAD patients. However, the increase in mean RRI, SD_{RR}, TP, VLFP, LFP, and HFP in the CAD group 60 minutes after FR was still present, whereas these measures were decreased in the control group 60 minutes after FR (Table 4). It seems that the beneficial effect of FR on HRV measures, especially on those measures

TABLE 5 The Percentage Changes in Heart Rate Variability Measures After Foot Reflexology*

	%X30	%X60
Control group (n = 17)		
Mean RRI; %	–0.6 (–4.0 to 4.8)‡	–4.2 (–9.1 to 0.9)
Heart rate; %	0.6 (–4.6 to 4.0)‡	4.3 (–0.8 to 10.0)‡
SD_{RR}; %	0.0 (–10.4 to 6.5)	–13.3 (–17.6 to –1.2)‡
CV_{RR}; %	–0.5 (–8.7 to 8.1)	–4.6 (–12.5 to 1.1)
TP; %	–5.7 (–21.9 to 18.4)	–28.0 (–36.0 to –8.4)‡
VLFP; %	-12.2 (–38.6 to 3.6)	–56.0 (–69.8 to –33.9)‡
LFP; %	0.0 (–15.7 to 19.1)	–23.2 (–39.6 to 13.3)‡
HFP; %	3.6 (–9.1 to 30.2)	–6.9 (–30.0 to 13.0)
nVLFP; %	–9.3 (–42.5 to 1.1)	–37.3 (–49.6 to –26.5)
nLFP; %	1.0 (–9.2 to 24.7)	14.1 (–2.9 to 23.5)
nHFP; %	9.9 (–0.0 to 41.3)	18.0 (7.8 to 52.0)
LFP/HFP; %	–14.3 (–28.5 to 16.6)	–5.7 (–23.2 to 7.9)
CAD group (n = 20)		
Mean RRI; %	6.6 (3.1 to 11.1)†	10.9 (3.5 to 17.7)†
Heart rate; %	–6.2 (–10.0 to –3.1)†	–9.9 (–15.0 to –3.4)†
SD_{RR}; %	4.3 (–8.7 to 23.7)	3.8 (–6.6 to 11.0)†
CV_{RR}; %	0.0 (–12.8 to 12.4)	–6.0 (–10.4 to –2.0)
TP; %	11.3 (–25.1 to 58.9)	14.5 (–13.3 to 38.5)†
VLFP; %	–0.3 (–39.9 to 21.6)	–14.5 (–40.6 to 10.3)†
LFP; %	7.6 (–22.3 to 72.8)	13.8 (–6.7 to 40.7)†
HFP; %	10.0 (–13.2 to 53.3)	32.4 (6.0 to 59.2)†
nVLFP; %	–16.4 (–28.2 to –2.9)	–18.4 (–40.6 to –4.5)
nLFP; %	0.5 (–6.7 to 7.1)	2.0 (–5.1 to 11.7)†
nHFP; %	8.9 (0.0 to 25.9)	15.1 (1.3 to 33.1)
LFP/HFP; %	–11.2 (–23.3 to 2.1)	–9.1 (–31.5 to 3.7)

*Values presented are medians (25-75 percentile).
†$P < .05$ between normal controls and patients with CAD.
‡$P < .05$ vs before FR.
§$P < .05$ vs 30 min after FR.
Abbreviations: CAD, coronary artery disease; RRI, RR intervals; SD_{RR}, standard deviation of RR; CV_{RR}, coefficient of variation of RR; TP, total power; VLFP, very low-frequency power; LFP, low-frequency power; HFP, high-frequency power; nVLFP, normalized very low-frequency power; nLFP, normalized low-frequency power; nHFP, normalized high-frequency power; LFP/HFP, low-/high-frequency power ratio.

TABLE 6 Effect of Beta-blockers on Heart Rate Variability in the Control and Coronary Artery Disease (CAD) Groups*

	Control Group (n = 17)	CAD Group (n = 20)
Without beta-blockers (n = 12)		
TP (ms2)	861.6 (696.0-9876.9)	1415.0 (467.0-2036.0)
VLFP (ms2)	312.0 (176.2-406.9)	218.0 (165.3-733.0)
LFP (ms2)	174.5 (158.5-255.1)	382.0 (127.7-641.2)
HFP (ms2)	373.3 (228.2-493.5)	460.5 (194.4-927.8)
nVLFP (nu)	36.0 (24.3-41.9)	31.2 (26.2-37.7)
nLFP (nu)	23.8 (20.2-29.2)	28.2 (26.4-31.3)
nHFP (nu)	42.9 (35.4-48.1)	37.7 (33.2-48.6)
LFP/HFP	0.53 (0.48-0.81)	0.82 (0.52-0.90)
With beta-blockers (n = 25)		
TP (ms2)	1083.1 (827.2-2104.0)	962.5 (7484.1-1375.0)
VLFP (ms2)	311.9 (197.5-514.1)	288.4 (173.8-444.4)
LFP (ms2)	337.1 (177.9-413.1)	256.8 (219.4-437.9)
HFP (ms2)	354.1 (318.7-625.3)	480.2 (318.4-546.6)
nVLFP (nu)	33.0 (30.3-41.3)	30.5 (24.1-32.7)
nLFP (nu)	28.3 (21.5-30.1)	28.6 (25.2-32.4)
nHFP (nu)	38.5 (32.6-44.0)	43.2 (35.5-46.2)
LFP/HFP	0.74 (0.59-0.81)	0.65 (0.53-0.82)

*Values presented are medians (25-75 percentile).
Abbreviations: TP, total power; VLFP, very low-frequency power; LFP, low-frequency power; HFP, high-frequency power; nVLFP, normalized very low-frequency power; nLFP, normalized low-frequency power; nHFP, normalized high-frequency power; LFP/HFP, low-/high-frequency power ratio.

related to vagal modulation, last longer in patients with CAD than in the controls. The mechanism responsible for this differential effect was not clear at present because it was not investigated in this study. We speculate that the FR-related autonomic nervous effect of increasing vagal and decreasing sympathovagal balance may be more evident in those patients who have depressed vagal modulation and enhanced sympathetic modulation, such as patients with CAD. Further studies are needed to disclose the underlying mechanism.

Other considerations include that the manipulation of FR on a participant did not allow him or her to rest uninterruptedly. Thus, a participant not receiving FR is not a good control to contrast the effect of FR on that person. If a control is going to be used to contrast the effect of FR, manipulating some area other than the foot that has no reflex points on it for the same period of time may be a better choice than a participant not receiving FR. According to the traditional Oriental medicine, no area over the whole body can be found that can be stimulated by pressure and massage without causing a physiological response in the body. Therefore, the participant not receiving FR in either group was not designed as a control to contrast the effect of FR in this study.

To know the differences in the effects of FR on patients who are on different medications and the effects of those medications on FR, we chose to compare the effect of beta-blockers on the HRV measures in both control and CAD groups. We found that there were no significant differences in all HRV measures between participants using or not using beta-blockers in either control or CAD group and between the control and CAD groups whether they were using beta-blockers or not (Table 6). Thus, there are no differences in the effects of FR on CAD patients whether or not they are on beta-blocker medication, and the beta-blockers do not significantly influence the effect of FR on the autonomic nervous modulation of the participants.

In conclusion, a higher vagal modulation, lower sympathetic modulation, and lower blood pressures can be observed following 60 minutes of FR in both angiographically patent controls and CAD patients. Though the magnitude of change in the autonomic nervous modulation of the CAD patients was slightly smaller than that of the controls, FR is a complementary therapeutic method to allopathic medical care that is simple and safe for almost everyone. FR requires very little time and expense, no special equipment, and no medication and can be performed practically anywhere. Since the mortality risk due to acute myocardial infarction is lower in patients with higher vagal modulation and is higher in patients with higher sympathetic modulation, our research suggests that FR is a safe, low-cost adjunct

treatment that can be used as an effective physiological vagal enhancer and sympathetic suppressor in both control and CAD patients to benefit cardiovascular health.

Acknowledgments

This study was supported by the project VGHUST93-P1-08 of the Joint Research Program of Veterans General Hospital and University System, Taiwan, and the project CCMP97-RD047 of the Committee on Chinese Medicine and Pharmacy, Department of Health, Taipei, Taiwan.

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Effect of the Combination of Music and Nature Sounds on Pain and Anxiety in Cardiac Surgical Patients: A Randomized Study

Susanne M. Cutshall, MS, RN, ACNS-BC; Patricia G. Anderson, MS, RN, ACNS-BC; Sharon K. Prinsen, MS, RN; Laura J. Wentworth, MS, RN, ACNS-BC; Tammy L. Olney, BSN, RN; Penny K. Messner, DNP, RN, ACNS-BC; Karen M. Brekke; Zhuo Li; Thoralf M. Sundt III, MD; Ryan F. Kelly; Brent A. Bauer, MD

Background • Postoperative pain and anxiety are common in cardiac surgery patients. Studies have suggested that music can decrease anxiety in hospitalized patients.
Primary Study Objective • This study focused on the efficacy and feasibility of special music, which included nature sounds, for pain and anxiety.
Methods/Design • In this randomized controlled trial, postoperative cardiovascular surgery patients were randomly assigned to a music group to receive 20 minutes of standard postoperative care and music twice daily on postoperative days 2 through 4 or to a control group to receive 20 minutes of standard care with a quiet resting period twice daily on postoperative days 2 through 4.
Setting • Cardiovascular surgical unit of Saint Marys Hospital, Rochester, Minnesota.
Participants • One hundred patients completed the study (music group, n = 49; control group, n = 51).
Intervention • The music was delivered through CD players in the patients' rooms.
Primary Outcome Measures • Pain, anxiety, satisfaction, and relaxation were evaluated from visual analog scales.
Results • Data showed a significant decrease in mean (SD) pain scores after the second session of day 2 for the music group (change, −1.4 [1.4]) compared with the control group (change, −0.4 [1.4]) (P = .001). Mean relaxation scores improved more at the first session of day 2 for the music group (change, 1.9 [2.7]) compared with the control group (change, 0.3 [2.9]) (P = .03). The music group also showed lower anxiety and increased satisfaction overall, but these differences were not statistically significant. No major barriers to using the therapy were identified.
Conclusion • Recorded music and nature sounds can be integrated into the postoperative care of cardiovascular surgery patients. The recordings may provide an additional means for addressing common symptoms of pain and anxiety while providing a means of relaxation for these patients. (*Altern Ther Health Med.* 2011;17(4):16-23.)

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Authors' notes: Mayo Clinic does not endorse the product mentioned in this article. The authors have no conflict of interest to disclose.

Coronary artery bypass graft (CABG) and cardiac valve surgery are performed more than 700 000 times each year in medical facilities throughout the United States.[1] Even though technology has improved dramatically and the outcomes of these operations are generally successful, open heart surgery is a major surgical procedure. Patients experience pain and anxiety, and they usually stay in the hospital for a week after heart surgery.[2,3]

Frequently, patients who undergo cardiac surgery experience anxiety as they anticipate unfamiliar or uncomfortable events

before and after surgery.[4,5] During recovery after surgery, patients may feel helpless and be concerned about loss of control, physical discomfort, and doubts about their progress.[2,6] In addition, unfamiliar environments and sounds can create physiologic complications and delay recovery.[7,8]

Along with having anxiety, patients experience pain after cardiac surgery. This type of postoperative pain has no functional value beyond signaling the presence of tissue damage from surgery, and it may actually have harmful psychologic and physiologic consequences. As the stress response increases, wound healing may be impaired.[8,9] Pain also interferes with the patient's sleep and appetite and can create anxiety, compounding complications with other components of the cardiovascular system and gastrointestinal tract, thereby prolonging recovery.[10,11]

The Agency for Healthcare Research and Quality recommendations for pain management include the use of cognitive-behavioral interventions such as relaxation, music, distraction, and imagery.[12] These interventions have been shown to reduce the amount of pain medication used and to improve the management of pain and anxiety.[13,14]

Music is well known as a positive integrative therapy with its therapeutic qualities of enhancing well-being, reducing anxiety and stress, and distracting people from unpleasant painful stimuli.[13,15-19] Ambient Therapy (Ambience Medical, Omaha, Nebraska) uses specifically designed music that combines natural sounds recorded in a 200 x 200–foot time-delay algorithm with musical parts created to enhance emotions. These specifically recorded sounds of nature are thought to minimize the patient's perception of spikes or startle sounds in his or her environment. This effect is hypothesized to provide patients with a new perceptual reality so that the hospital environment is soothing and comforting, helping the patient counteract feelings of pain and anxiety.[20] Evidence shows that a convergence occurs between sensory input (such as ambient music) and neural output (through the central nervous system) that regulates pain and stress responses.[21]

The purpose of this study was to test the effects of structured music with nature sounds on the level of pain and anxiety in cardiac surgical patients.

METHODS

Research Design

A stratified randomized experimental design was used to assign patients to standard postoperative care in combination with ambient music sessions (the music group) or to standard postoperative care in combination with matched quiet resting sessions (the control group) (Figure 1). This protocol was reviewed and approved by the Mayo Clinic Institutional Review Board.

Research Setting

The participants were cardiac surgical patients at Saint Marys Hospital in Rochester, Minnesota. Data were collected while the patients were in the cardiovascular surgical intensive care and progressive care units of the hospital.

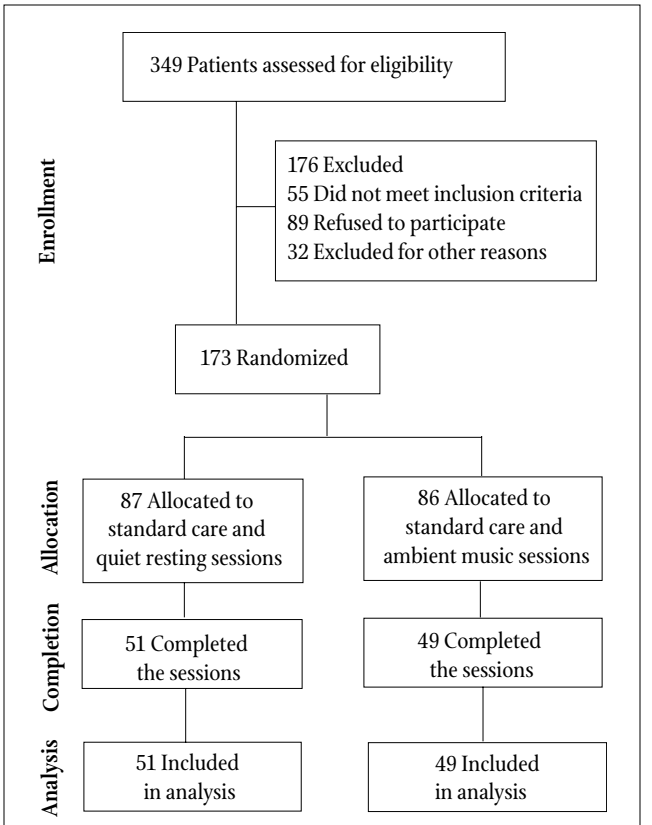

FIGURE 1 Patient Flowchart. In this randomized controlled trial, cardiac surgical patients were randomly assigned to receive standard postoperative care with sessions of either quiet rest or ambient music.

Inclusion Criteria

Participants were cardiac surgical patients, aged 18 years or older, who had undergone first-time CABG surgery or cardiac valve surgery (or both) and had consented to participate in the study.

Exclusion Criteria

Patients were excluded from the study if they were non–English speaking, if they were intubated on postoperative day 2, or if they had a diagnosis of chronic pain, a chronic psychiatric disorder, or a hearing impairment that would interfere with hearing the music.

Randomization

At the start of postoperative day 2, patient pain levels were assessed on a scale from 0 (no pain) to 10 (the most intense pain), and stratification for randomization was based on a pain level of 4 or less (the institutional pain level goal) or greater than 4. The randomization was blocked to ensure balanced allocation throughout the course of the study. There were 25 randomized blocks of 4 patients and 25 randomized blocks of 2 patients. Each set of 50 blocks was changed into a random order as well. To account for potentially nonrandom dropouts, the randomization scheme was determined in advance for 150 patients per stratum, and enrollment was continued until at least 100 patients in total had completed day 4 of the study. The use of cards in sealed envelopes prevented the study coordinator

who was enrolling patients from knowing to which group each patient was randomly assigned.

Interventions

Music Group. On postoperative day 2, the study coordinator met with each patient in the music group, confirmed consent, and explained the process of randomization based on pain level. Patients were encouraged to assume a comfortable position in bed during the intervention. The study coordinator read to the patient a printed script and obtained measurements of pain, anxiety, satisfaction, and relaxation orally with a visual analog scale (VAS). The coordinator then measured the patient's blood pressure and heart rate. The patient was given a choice of four compact discs (CDs): *Summer Song*, *Autumn Song*, *Bird Song*, or *Night Song*. Each private room was equipped with a CD player on the nightstand next to the bed. The selected CD was played for 20 minutes twice daily on postoperative days 2 through 4, in the morning (between 8 AM and noon) and in the afternoon (between 1 PM and 6 PM). During the intervention, the patient's room door was closed, and a sign was posted stating, "Do Not Disturb/Patient Resting." After the 20 minutes of music therapy, measurements were repeated for pain, anxiety, relaxation, satisfaction, blood pressure, and heart rate. Data were collected on age, sex, surgical procedure, and total daily dosage of opioids administered over the 3-day period for both groups.

Control Group. On postoperative day 2, the study coordinator met with each patient in the control group, confirmed informed consent, and explained the process of randomization based on pain level. Patients assigned to the control group were encouraged to rest for 20 minutes in bed. Pain, anxiety, relaxation, satisfaction, blood pressure, and heart rate data were collected before and after the rest period. A "Do Not Disturb/Patient Resting" sign identical to that for patients in the music group was posted at the patient's door.

Evaluation

Patients reported measures of pain, anxiety, relaxation, and overall satisfaction before and after interventions on postoperative days 2, 3, and 4. A VAS was used to evaluate pain, anxiety, relaxation, and overall satisfaction before and after the intervention (ambient music or quiet rest). For pain and anxiety, negative changes indicated improvement, whereas for relaxation and satisfaction, positive changes indicated improvement. Heart rate and blood pressure measurements were collected by the study coordinator before and after each 20-minute session.

Sample Justification

It was estimated that a sample size of approximately 50 patients per group (100 total) completing the study on day 4 would be needed to detect an effect size of 0.60 at 80% power for a 2-tailed Wilcoxon rank sum test with an α level of .05.

Statistical Analysis

Data were analyzed with descriptive statistics. Continuous variables were summarized as mean (standard deviation) and median. Categorical variables are presented as frequency and percentage of group totals. The changes in measurements of pain, anxiety, relaxation, satisfaction, blood pressure, and heart rate from before the intervention to after the intervention were compared between music and control groups. The analysis also compared the difference in the amount of opioid medications used during days 1 through 5 between groups.

Comparisons of continuous variables between groups, such as pain and anxiety levels, were evaluated with the two-sample *t* test or Wilcoxon rank sum test. Between-group comparisons of categorical variables, such as sex, were assessed using the χ^2 test or Fisher exact test. Since age was significantly different between the two groups, the difference in change of anxiety and pain between groups was also tested with age-adjusted linear models. *P* values of less than .05 were considered statistically significant.

RESULTS

The characteristics of the two groups were similar for sex, type of surgery, and baseline pain score. Most participants were male (76% in the music group and 78% in the control group). The majority of patients had a baseline pain score of 4 or less. All patients were extubated on the day of surgery or early the next morning. Chest tubes were placed in all patients and were removed according to standard practice (ie, in approximately 2-3 days). In both groups, more patients had either a CABG or a heart valve procedure than a combination of both. Patients in the music group were older than patients in the control group (mean age, 66 [13] years vs 60 [12] years; *P*=.03) (Table 1).

TABLE 1 Demographic and Clinical Features of Patients in the Ambient Music Group and Patients in the Control Group

Feature	Music (n=49)	Control (n=51)	*P* value*
Age, y			.03
Mean (SD)	65.6 (12.9)	60.2 (12.4)	
Median	67	60	
Length of stay, d			.48
Mean (SD)	5.9 (3.6)	7.9 (12.8)	
Median	5	5	
Gender, no. (%)			.73
Female	12 (24.5)	11 (21.6)	
Male	37 (75.5)	40 (78.4)	
Baseline pain score, no. (%)			.90
≤4	35 (71.4)	37 (72.6)	
>4	14 (28.6)	14 (27.5)	
Surgical procedure, no. (%)			.59
CABG	17 (34.7)	15 (29.4)	
CABG+valve	7 (14.3)	5 (9.8)	
Valve	25 (51.0)	31 (60.8)	

Abbreviation: CABG, coronary artery bypass graft.
**P* values are based on comparisons of mean values for the 2 groups.

Data showed a significant decrease in mean pain scores after the second session of day 2 for the music group (change, –1.4 [1.4]) compared with the control group (change, –0.4 [1.4]) (P = .001) (Figure 2). Mean relaxation scores improved more at the first session of day 2 for the music group (change, 1.9 [2.7]) compared with the control group (change, 0.3 [2.9]) (P = .03). Besides the difference mentioned above, the music group had lower anxiety and increased satisfaction overall, although these differences were not statistically significant (Figures 3-5).

Diastolic blood pressure decreased significantly on day 4 after session 2 in the music group compared with the control group (Table 2). The differences in the various outcomes between groups remained after age difference was adjusted in models. There was a trend of decreasing opioid use on day 3 in the music group that was not statistically significant (Table 3).

Several qualitative observations were noted. The study coordinator found that patients and families were very receptive to being in the study and listening to music selections or having quiet time. There were individual preferences for certain selections; some patients preferred specific combinations of music and nature sounds. In both groups, some patients brought their own music to listen to outside of the study sessions, and some patients listened to music in the operating room, too. The coordinator found that it was difficult for patients to not be interrupted during the session in the busy cardiac surgical unit and that it was a little easier to locate patients in their rooms in the afternoon. Nurses were receptive to the study interventions and made comments about the positive effect on the environment for the patients and for themselves.

DISCUSSION

In this study, patients in the music group had a significant reduction in pain soon after surgery and an overall trend of increases in reported relaxation scores. They also had an overall trend of lower reported anxiety scores and a trend of increased levels of satisfaction with care overall. These results are consistent with those of other studies that examined the effects of music listening in hospitalized patients.[13-19] Assisting patients with any amount of reduction in pain and anxiety after cardiac surgery is valuable for healing and improving the overall experience for the patients.[22,23] Research on pain management suggests that early treatment to relieve pain may help prevent long-term pain.[22] Interventions such as ambient music should be considered as an adjuvant for more complete relief of postoperative pain for cardiac surgery patients. This recommendation is confirmed by a similar study with cardiac surgery patients at another medical facility with similar patient populations.[24]

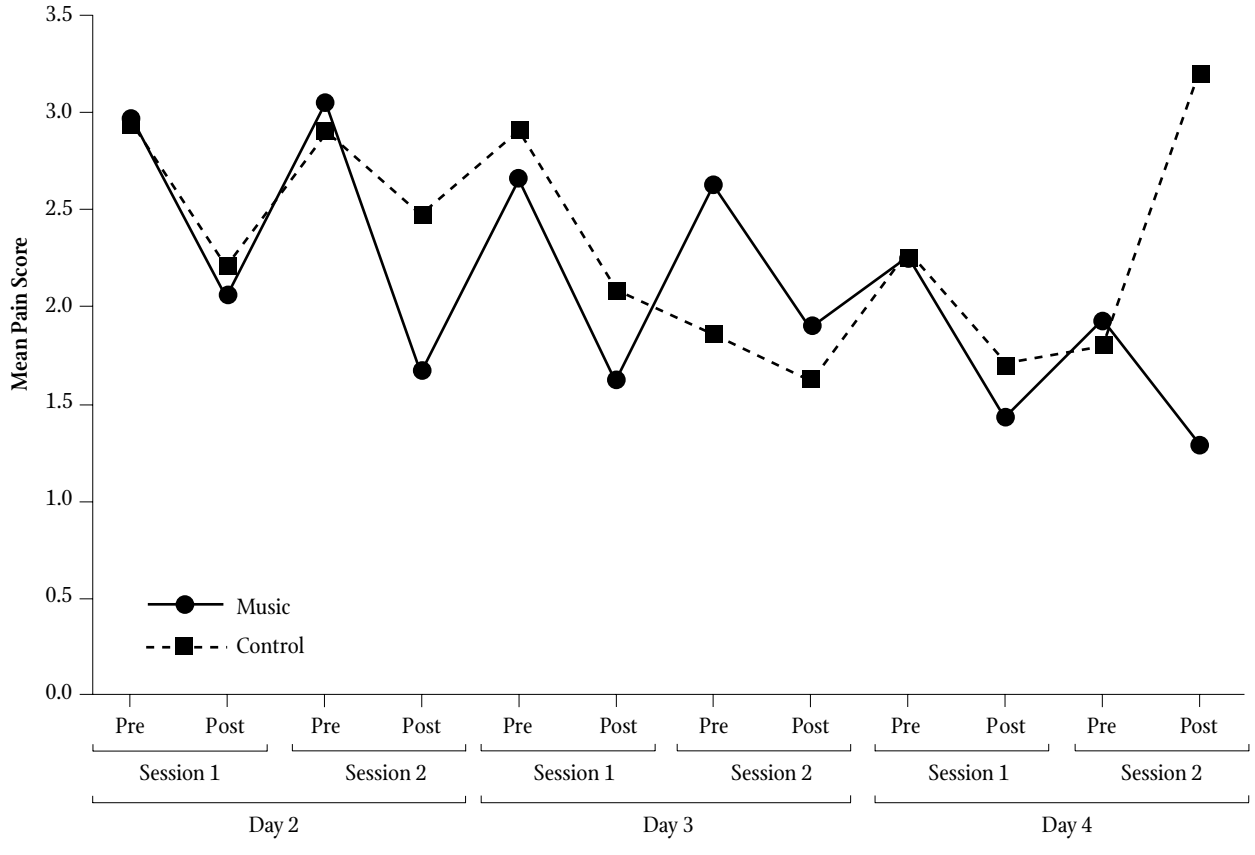

FIGURE 2 Mean Pain Scores. Patients rated their pain on a scale from 0 (no pain) to 10 (the most intense pain) before (Pre) and after (Post) each session of ambient music (for patients in the music group) or quiet rest (for patients in the control group).

TABLE 2 Variable Measurements Before and After Intervention Sessions for Patients in the Ambient Music Group and Patients in the Control Group

	Music				Control				
Variable*	**n**	**Mean**	**SD**	**Median**	**n**	**Mean**	**SD**	**Median**	***P* value†**
				Day 2					
Change after session 1									
Pain	49	−0.9	1.6	−1	51	−0.7	1.7	0	.67
Anxiety	49	−0.7	1.3	0	51	−0.3	1.8	0	.50
Relaxation	49	1.9	2.7	1	51	0.3	2.9	0	.03
Systolic blood pressure, mm Hg	49	−3.8	15.5	−1	51	−1.6	11.2	−1	.76
Diastolic blood pressure, mm Hg	49	−0.4	7.1	−1	51	−0.9	7.2	0	.88
Heart rate, beats per minute	49	−0.3	5.1	0	51	1.7	9.5	0	.30
Satisfaction with care	49	0.3	1.5	0	50	−0.3	1.9	0	.17
Change after session 2									
Pain	48	−1.4	1.4	−1	50	−0.4	1.4	−1	.001
Anxiety	48	−0.3	1.3	0	50	−0.4	1.3	0	.55
Relaxation	48	1.4	2.5	1	49	1.3	3.1	1	.47
Systolic blood pressure, mm Hg	48	−5.6	20.2	−2.5	49	−1.9	9.8	−1	.56
Diastolic blood pressure, mm Hg	48	−1.1	7.0	−0.5	47	−2.9	6.4	−2	.10
Heart rate, beats per minute	48	0	4.4	0	50	−0.6	4.4	0	.88
Satisfaction with care	48	−0.3	2.1	0	49	−0.1	2.1	0	.86
				Day 3					
Change after session 1									
Pain	49	−1.1	1.9	−1	51	−0.8	2.0	−1	.58
Anxiety	49	−0.4	1.5	0	51	−0.2	2.3	0	.97
Relaxation	49	0.5	2.7	0	51	1.0	2.6	0	.67
Systolic blood pressure, mm Hg	49	1.5	13.0	0	47	−2.0	9.4	0	.18
Diastolic blood pressure, mm Hg	49	1.9	10.6	0	47	−1.4	6.5	0	.10
Heart rate, beats per minute	49	1.5	6.9	1	48	−0.4	8.1	−0.5	.04
Satisfaction with care	49	−0.04	1.3	0	50	−0.04	0.8	0	.97
Change after session 2									
Pain	47	−0.7	2.2	0	50	−0.3	1.7	0	.15
Anxiety	47	−0.3	1.4	0	50	−0.6	1.4	0	.09
Relaxation	47	1.3	1.9	1	50	0.7	3.3	0	.33
Systolic blood pressure, mm Hg	47	1.1	12.3	0	48	−0.6	8.3	0.5	.86
Diastolic blood pressure, mm Hg	47	1.8	9.3	0	48	−0.6	11.6	0	.23
Heart rate, beats per minute	47	−1.1	8.0	−1	49	1.4	6.1	1	.15
Satisfaction with care	46	0.1	1.4	0	49	−0.02	0.4	0	.33
				Day 4					
Change after session 1									
Pain	48	−0.8	1.4	0	51	−0.6	1.4	0	.11
Anxiety	48	−0.6	1.9	0	51	−0.5	1.3	0	.77
Relaxation	48	0.6	2.5	0	51	0.4	2.0	0	.36
Systolic blood pressure, mm Hg	47	−3.4	12.6	−3	49	−2.6	16.5	−2	.61
Diastolic blood pressure, mm Hg	47	−1.3	15.8	−3	49	−1.0	9.1	−2	.34
Heart rate, beats per minute	47	−0.8	11.6	−1	51	−0.5	8.6	−1	.65
Satisfaction with care	47	0.2	1.0	0	51	0.2	1.5	0	.20
Change after session 2									
Pain	47	−0.7	1.8	0	51	1.4	10.9	0	.11
Anxiety	47	−0.5	1.1	0	51	−0.1	1.6	0	.37
Relaxation	47	0.8	1.7	0	51	1.0	2.0	0	.94
Systolic blood pressure, mm Hg	47	−4.6	11.8	−3	50	−2.6	10.9	−1	.38
Diastolic blood pressure, mm Hg	47	−3.5	9.0	−4	50	−0.6	6.4	0	.047
Heart rate, beats per minute	47	−2.7	6.8	0	48	−1.2	7.7	0	.69
Satisfaction with care	47	0.1	0.4	0	51	0.1	0.9	0	.42

*Pain, anxiety, relaxation, and satisfaction were evaluated with a visual analog scale from 0 (least amount) to 10 (greatest amount).
†*P* values are based on comparisons of mean values for the 2 groups.

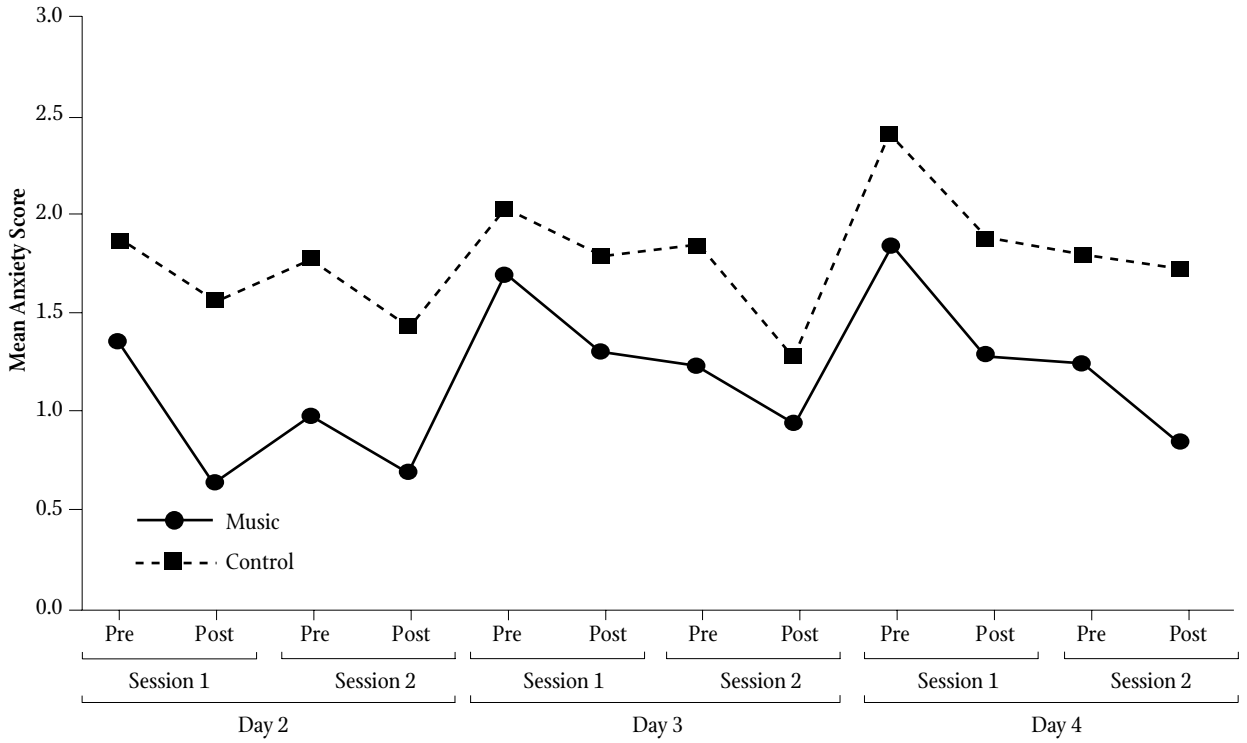

FIGURE 3 Mean Anxiety Scores. Patients rated their anxiety on a scale from 0 (least) to 10 (most) before (Pre) and after (Post) each session of ambient music (for patients in the music group) or quiet rest (for patients in the control group).

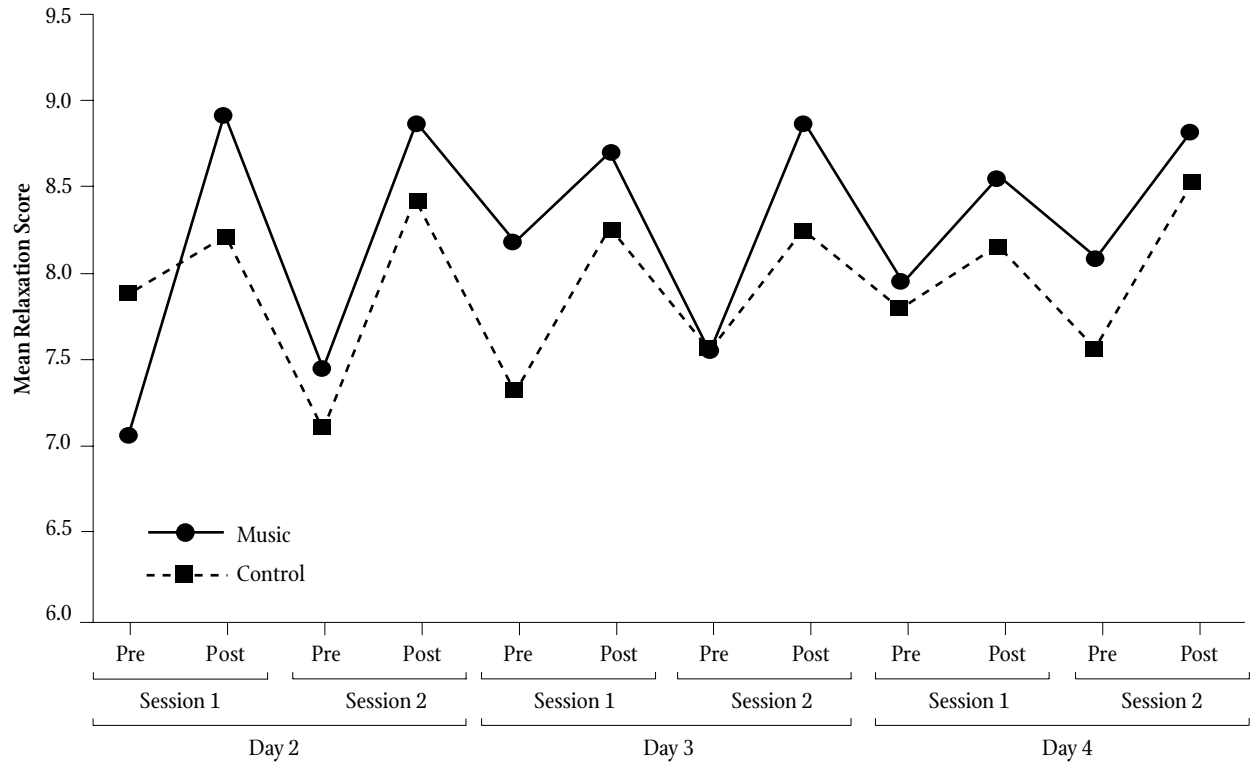

FIGURE 4 Mean Relaxation Scores. Patients rated their relaxation on a scale from 0 (least) to 10 (most) before (Pre) and after (Post) each session of ambient music (for patients in the music group) or quiet rest (for patients in the control group).

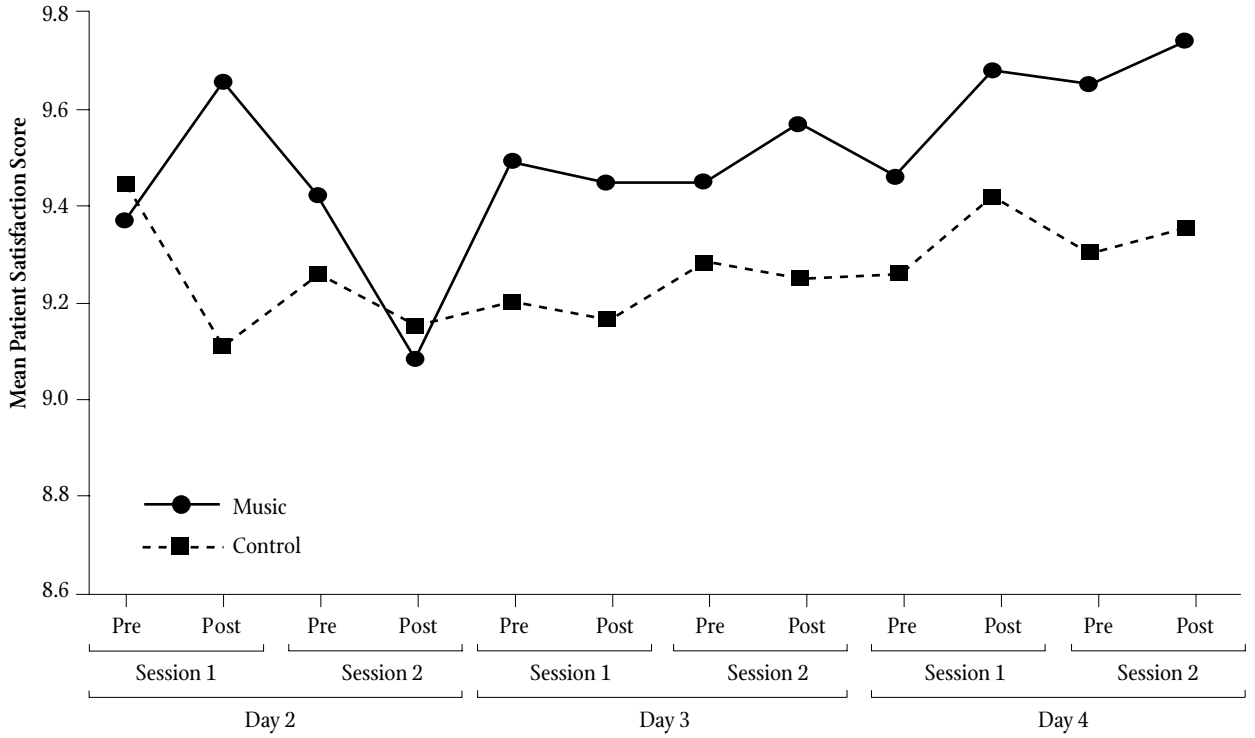

FIGURE 5 Mean Satisfaction Scores. Patients rated their satisfaction on a scale from 0 (least) to 10 (most) before (Pre) and after (Post) each session of ambient music (for patients in the music group) or quiet rest (for patients in the control group).

TABLE 3 Dosages of Fentanyl and Oxycodone in the Ambient Music Group and the Control Group

	Music Patients			Control Patients			
Drug	**n**	**Mean (SD)**	**Median**	**n**	**Mean (SD)**	**Median**	***P* value***
Day 1							
Fentanyl, μg daily	43	197.5 (113.6)	176	44	283.6 (211.7)	258	.13
Oxycodone, mg twice daily	6	7.5 (4.2)	5	7	9.3 (3.5)	10	.42
Day 2							
Fentanyl, μg daily	46	594.5 (426.1)	488	51	657.4 (473.2)	490	.55
Oxycodone, mg twice daily	25	16.2 (15.7)	10	29	16.7 (9.5)	15	.28
Day 3							
Fentanyl, μg daily	40	349.1 (327.0)	240	45	344.3 (292.7)	260	.75
Oxycodone, mg twice daily	33	16.8 (11.3)	10	35	22.0 (13.1)	20	.07
Day 4							
Fentanyl, μg daily	14	187.7 (218.6)	80	18	219.2 (240.0)	130	.89
Oxycodone, mg twice daily	26	16.2 (10.8)	13	27	20.9 (12.3)	20	.14
Day 5							
Fentanyl, μg daily	3	300.3 (217.1)	180	3	174.3 (96.3)	160	.41
Oxycodone, mg twice daily	15	24.0 (17.3)	20	18	20.6 (13.4)	18	.65

**P* values are based on comparison of mean values for the groups.

This study has a number of limitations. The intervention was limited to a particular type of music with nature sounds. Allowing patients to choose their own music might strengthen the impact of the intervention. We did not restrict patients in either group from using their own music. Thus, some of the controls may have been exposed to the intervention (or to music of a similar nature). This could have weakened the effect seen in the present study. Finally, all subjects were patients undergoing cardiovascular surgery, so the

results cannot necessarily be generalized to other populations.

An understanding of the role of treatment modalities, such as music and nature sounds, in managing anxiety and pain is needed to help achieve a balance between pain medications and the assorted side effects.[11,18] Patients are increasingly seeking integrative therapies, and numerous facilities are incorporating them into the care provided. One study suggested that approximately 50% of patients have incorporated the use of integrative therapies for pain management because conventional pain medications were not effective in relieving pain.[25]

Music is considered a simple, cost-effective way to improve a person's mood and decrease anxiety and pain associated with surgery or other medical procedures.[21,26] Hospitalization and illness are stressful and are often associated with fear of pain. Stress and pain during hospitalization may interfere with sleep quality, appetite, digestion, behavior, and wound healing, resulting in longer hospital stays.[6,9,27]

Future studies would be beneficial to confirm the results of the present study and to explore the effect of natural sounds in producing outcomes. The frequency and timing of music listening needs to be explored, especially in a busy hospital with many possible interruptions. Although this music study had structured music times during the day, patients may prefer music at other times during the day. Another consideration is the preoperative and intraoperative role of ambient music. Patient preferences also may be a key component of the effectiveness of such therapies and could be addressed in future studies that offered a wider range of music and nature sounds.

In conclusion, this study showed that recorded music and nature sounds can be integrated into the postoperative care of cardiovascular surgery patients. For cardiovascular surgery patients, ambient music may provide an additional means for addressing common symptoms of pain and anxiety while providing a means of relaxation. The use of any complementary modalities that can provide some symptomatic relief and increase patient satisfaction is a welcome addition to patient care and provides patients with options to consider to improve the hospital or surgical experience.

Acknowledgments

We gratefully acknowledge the participation of the Healing Enhancement team members in assisting and supporting this study. The CDs used in this study were donated by Ambience Medical. We also acknowledge the Saint Marys Hospital Auxiliary for its ongoing support in providing the gift of music and other healing resources for our patients. Finally, this work was further supported by a generous gift from Richard J. and Sharon M. Mrocek.

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Clinical Depression: An Evidence-based Integrative Complementary Medicine Treatment Model

Jerome Sarris, PhD, MHSc

Background • Clinical depression has a major impact on individuals and society, often presenting the clinician with a significant challenge. Recent evidence suggests that synthetic antidepressants—although effective in the treatment of severe depressed mood—may have only a weak effect against mild-moderate forms of depression. In such cases, nonpharmaceutical options may be indicated. Furthermore, research findings suggest that select natural products are effective adjuvants when combined with synthetic antidepressants. Research concerning the treatment of depression emphasizes individual monotherapies, which is often incongruent with clinical reality. In practice, clinicians often use a variety of interventions; however, this approach may not be systematic, and many interventions used may not be based on strong evidence.

Primary objective • This article proposes an evidence-based prescriptive clinical model based on the biopsychosocial model to treat unipolar depression. The "Antidepressant-Lifestyle-Psychological-Social (ALPS) depression treatment model" integrates nonpharmacological interventions (such as complementary medicines, lifestyle advice, and psychosocial techniques) for use by clinicians.

Results • Initially a review of nonpharmacological mood-elevating interventions was undertaken. Evidentiary support was revealed for use of psychological techniques such as cognitive and behavioral medicine and interpersonal therapy, St John's wort, S-adenosyl methionine, and aerobic and anaerobic exercise. There were inconsistent research findings for acupuncture, omega-3 fish oils, and L-tryptophan for depressed mood. From these evidence-based interventions an integrative model was formed. Clinical recommendations in addition to a practical stepped-care decision tree are outlined.

Conclusion • The ALPS model has the potential to improve treatment outcomes and reduce relapse rates in clinical depression and warrants research using rigorous and appropriate methodology. (*Altern Ther Health Med.* 2011;17(4):26-37.)

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Depression is prevalent in Western societies, exacting a marked personal and socioeconomic cost. Clinical depression (as opposed to a normal depressive reaction to loss) is commonly characterized by either a low mood and/or a loss of pleasure in combination with psychophysiological changes (eg, appetite, sleep, energy, feelings of worthlessness or guilt, or suicidal thoughts).[1] The diagnostic term "major depressive disorder" (MDD) is used for a clinical depressive episode that lasts longer than 2 weeks and is uncomplicated by recent grief, substance abuse, or a medical condition.[2] By the year 2020, depression is projected to effect the second greatest increase in morbidity after cardiovascular disease, presenting a significant socioeconomic burden.[3] The lifetime prevalence of depressive disorders varies depending on the country, age, sex, and socioeconomic group and affects approximately one in six people.[4,5] The 12-month prevalence of MDD is approximately 5% to 8%, with women being approximately twice as likely as men to experience an episode.[4,5]

Several biological and psychological models theorizing the cause(s) of depression have been proposed. The predominant biological model of depression in the last 60 years has been the monoamine hypothesis, which centers on the theory that monoamine dysfunction (in particular serotonin) is the primary causation of depression.[6] Other major biological theories involve the homocysteine hypothesis[7] and the inflammatory cytokine depression theory.[8] A prominent psychological model is the stress-diathesis model, which promulgates the theory that a combination of vulnerabilities (genetic, parenting, health status, cognitions) are exploited by a life stressor, such as a relationship breakup, job loss, or death of a family member.[9,10] These stressful events may trigger a depressive disorder. Various factors may increase the risk of MDD, with early age of onset and recurrence being major factors in susceptibility for an episode.[1] Genetic vulnerability also may play an important role. Genetic studies have revealed that polymorphisms relevant to monoaminergic neurotransmission are seen in some people who experience MDD, although data are

currently inconclusive regarding specific genetic polymorphisms.[11] Recent hypotheses suggest that genes related to neuroprotective/toxic/trophic processes and to the overactivation of the hypothalmic pituitary adrenal axis (HPA axis) may be involved in pathogenesis of MDD.[11] Current evidence suggests that the primary risk factors involved in MDD are a complex interplay involving genetics and exposure to depressogenic life events.[9,11] Early life events or proximal stressful events increase the risk of an episode, with twin studies providing evidence of the effect of environmental stressors on depression.[12] People with recurrent depressive episodes and a young age at onset present with the greatest familial risk.[13] Protective factors are considered to be good genetics, balanced positive cognitions, healthy interpersonal relations and social support, and spirituality.[1,14]

Current medical treatments for MDD primarily involve synthetic antidepressants (eg, tricyclics, monoamine oxidase inhibitors [MAOIs]), selective serotonin reuptake inhibitors (SSRIs) and psychological interventions (eg, cognitive behavioral therapy [CBT], interpersonal therapy [IPT], behavioral therapy [BT]).[15] Medical treatment guidelines usually involve options such as providing counseling, CBT, or IPT for mild depression; antidepressants and/or CBT for moderate depression; and antidepressants and electroconvulsive therapy (ECT) and possibly hospitalization for severe depression.[16,17]

A more integrative model concerning etiology and treatment of depression has been proposed: the biopsychosocial model, which views the causation of depression as being multifactorial, with many interrelated influences considered to be involved in a depressive disorder (Figure 1).[18] Genetics and biochemistry (biological), cognitions and personality traits (psychological), environmental factors (environmental), and social interactions (sociological) all affect the level of a person's vulnerability to developing a depressive disorder, which is commonly triggered by chronic or acute stressor(s). The biopsychosocial model suits the complementary and alternative medicine (CAM) paradigm, which treats patients from a "whole systems" approach, regards all biological systems as interrelated and fluidic, and views disease causation as being profoundly influenced by a complex of psycho-physio-sociological factors.[19]

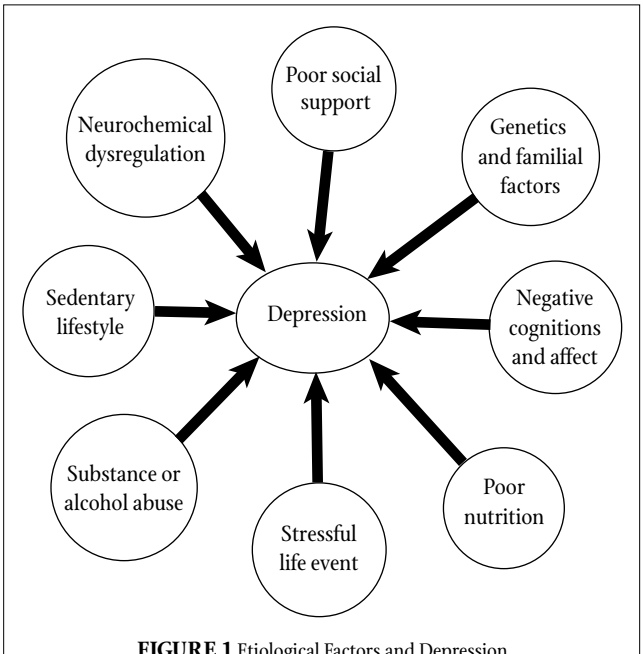

FIGURE 1 Etiological Factors and Depression

As the evidence indicates that depression is commonly inadequately treated[20] and the mainstream medical approach of drug therapy appears to only achieve first treatment remission in approximately one-third of patients,[21] improved treatment methods are urgently needed. Strategies to improve outcomes that have supportive evidence include combination approaches (such as combining different pharmacotherapies and/or psychological techniques),[22,23] stepped-care models,[24] collaborative crossdisciplinary approaches,[25] and enhanced case management.[17] Though improved outcomes are generally found, the financial cost is much higher with these approaches, and in the case of augmentation approaches (adding additional pharmacotherapies to antidepressants), remission rates are not significantly improved.[20] Although initial costs may be higher when such integrative approaches are used, these may be offset by future savings from increased work productivity and commensurate lower demands on health resources.[24,26] An integrative clinically focused biopsychosocial model developed from evidence-based interventions also may achieve better outcomes than monotherapy alone. As reflected in CAM practice, a variety of interventions are commonly used in an integrative manner to treat health conditions. Whereas individual interventions may have evidence as monotherapies, combinations of treatments addressing the causes of depressed mood from the perspective of the biopsychosocial model may be synergistically more effective in achieving initial treatment response and improving long-term remission of depressed mood.

The focus of this article is to detail the current nonpharmacologic interventions for which there is evidence in the treatment of depression within a clinical model. Pharmaceutical antidepressants are not evaluated in this article; see Cipriani et al (2007) and Arroll et al (2008) for reviews.[27,28] As a recent review by Fournier et al (2010) in the *Journal of the American Medical Association* details, emerging evidence has revealed that synthetic antidepressants (such as SSRIs, tricyclics, and MAOIs) may have a weak effect against depressive symptoms in people with milder forms of depression.[29] Furthermore, clinical guidelines often don't endorse antidepressants as the primary first-line intervention for milder forms of MDD and often are regarded as widely overprescribed.[30] These drugs are, however, efficacious against more severe depressed mood. Due to this, the proposed model outlined in this article is more applicable for treating mild-moderate depression or as an adjuvant approach with pharmacotherapies in more severe cases of MDD.

Though integrative psychiatrists James Lake[31] and Robert Zuess[32,33] have developed and advocated integrative clinical models, a search of the journal literature revealed only one peer-reviewed published paper on an integrative CAM-based model

to treat depression: a two-part publication by Zuess detailing an integrative approach to the etiology and treatment of depression. Though the work of Lake and Zuess can be lauded as landmark contributions to the field, further refinement is required in presenting a comprehensive evidence-based model with clear clinical application. Furthermore, an updated review of the current evidence forming the interventions in the model needed to be undertaken. Outlined below is the "Antidepressant-Lifestyle-Psychological-Social (ALPS) depression treatment model," a theoretical working model based on current nonpharmacotherapeutic evidence-based interventions. This model may be applied by medical or nonmedical practitioners to treat clinical depression as a stand-alone model or in conjunction with antidepressant medication.

METHODS

PubMed, CINAHL, Web of Science, and PsycINFO databases were searched during early 2010 providing an overarching review of biopsychosocial models used to treat depression. A further database search was conducted of key areas on (1) CAM natural products (eg, nutrients and herbal medicine); (2) CAM modalities (eg, acupuncture); (3) lifestyle interventions (eg, diet and exercise); (4) psychological techniques; and (5) social interventions. Studies included in the review of evidence met basic methodological requirements—randomized, double-blind, controlled, adequate sample size, and correct use of intervention (eg, dosage, time period). Where available and appropriate, meta-analyses and high-quality systematic reviews were used. Further review of the literature was undertaken to study the posited antidepressant mechanisms of action of these interventions. It should be noted that the emphasis of the narrative literature review was to locate evidence-based treatments of depression to be applied in an integrative model, as opposed to a comprehensive systematic review of individual studies.

THE ANTIDEPRESSANT-LIFESTYLE-PSYCHOLOGICAL-SOCIAL DEPRESSION TREATMENT MODEL

Overview

An integrative treatment model incorporating evidence-based interventions may provide advantages in the treatment of nonsevere forms of depressed mood over conventional pharmaceutical drugs, which may cause side effects and appear to have at best moderate efficacy in mild-moderate MDD. As outlined in the introduction, the essence of the biopsychosocial model is that the causation of depression can be viewed as multifactoral, with many interrelated influences considered to be involved in the onset of a depressive disorder.[18] Aside from good genetics, modifiable protective factors are considered to be balanced positive cognitions, healthy interpersonal relations and social support (from family, friends, and work environment), spirituality, regular exercise, and adequate nutrition. Thus, an integrative treatment plan based on the biopsychosocial model needs to address all of these aspects. Nutraceutical (herbal and nutritional products) and dietary prescription in addition to regular graded exercise of sufficient intensity potentially can be used to modulate the biological component of depression; psychological therapies and counseling support may be advised to reconfigure negative erroneous cognitions, resolve underlying issues, and build resilience; social elements (eg, healthy balanced work and rest and sufficient family/friend/community interaction) also should be addressed. Encouragement to explore spiritual growth from depression also may provide an existential context for developing meaning from the experience, thereby promoting self-growth.

Figure 2 displays a model developed by the author for treating depression: The ALPS model. This treatment model is based on biopsychosocial underpinnings, outlining specific strategies for holistically treating (or potentially preventing relapse) of mild-moderate depression. The model advocates a combined approach of nutraceutical thymoleptic agents (although pharmaceuticals

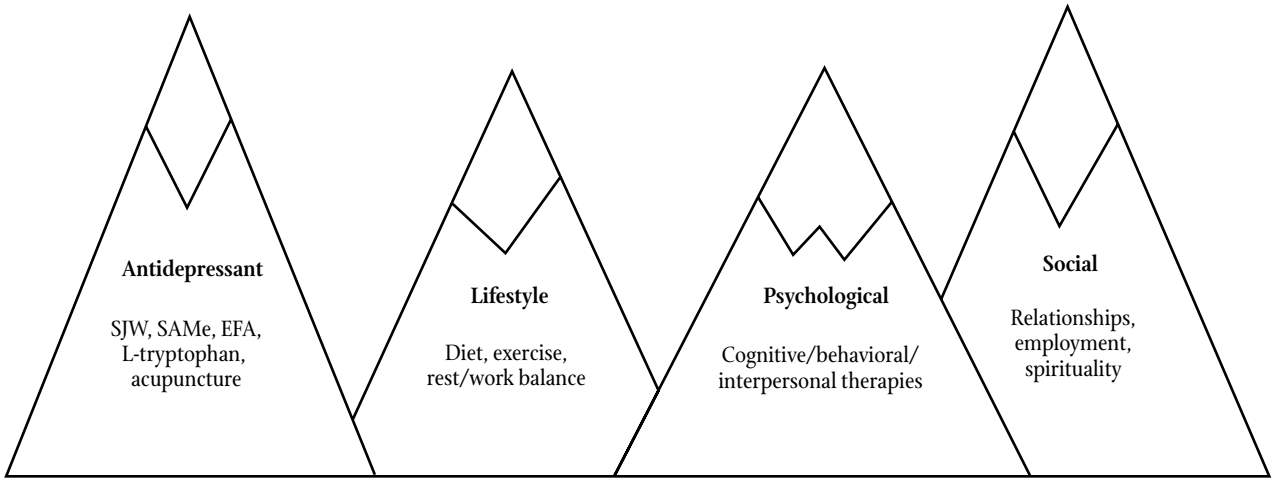

FIGURE 2 The Antidepressant-Lifestyle-Psychological-Social Depression Treatment Model

Abbreviations: SJW, St John's wort; SAMe, S-adenosyl-methionine; EFA, essential fatty acids.

can be replaced where warranted); lifestyle adjustments such as dietary improvement and reduction of alcohol and caffeine; adequate relaxation and regular exercise; appropriate psychological interventions; and improved social dynamics.

Individual Interventions: Overview of Evidence

A literature review was required to determine which nonpharmaceutical options have sufficient evidence of efficacy in the treatment of depressed mood. These evidence-based treatments were then applied as components to form a working clinical model. As detailed in Table 1, superior efficacy over controls was found for several interventions. Specifically, evidentiary support in varying degrees was found for herbal medicines (*Hypericum perforatum*, *Rhodiola rosea*, *Crocus sativus*); nutrients (L-tryptophan and 5-hydroxytryptamine [5-HTP], omega-3 fatty acids, S-adenosyl methionine [SAMe]; dehydroepiandrosterone [DHEA] was omitted as it is a hormone and a pharmacological drug); psychological techniques (eg, cognitive behavioral therapy, interpersonal therapy, mindfulness); physical exercise (aerobic, anaerobic, yoga); and social interventions (eg, group therapy, social skill development).

Evidence-based Interventions to Treat Depression

Antidepressants. In addition to synthetic antidepressants, several natural products have evidence as thymoleptics. Among them, *Hypericum perforatum* (St John's wort: SJW), a traditional phytomedicine used to treat nervous system disorders, has level-A evidence (Table 1). Enough human clinical trials have been conducted for several meta-analyses to be conducted.[34] All meta-analyses have revealed that SJW provides a significant antidepressant effect compared to placebo and an equivalent efficacy compared to synthetic antidepressants. In vivo and in vitro studies have revealed antidepressant activity via modulation of serotonin, dopamine, norepinephrine pathways (involving neurotransmitter transport systems, increased binding to various receptors, and decreased neurotransmitter degradation).[35] Aside from SJW, the herbal medicines *Rhodiola rosea* (rosenroot) and *Crocus sativus* (saffron) currently possess the most evidence as monoamine and neuroendocrine modulators, and have preliminary human clinical evidence of efficacy in treating MDD.[36, 37] *Rhodiola rosea* is a stimulating adaptogen, which possesses antidepressant, antifatigue, and tonic activity.[36,38] In animal models, *Rhodiola rosea* has been documented to increase noradrenaline, dopamine, and serotonin in the brainstem and hypothalamus and to increase the blood brain permeability to neurotransmitter precursors.[39] As detailed in Table 1, one randomized controlled trial (RCT) has documented efficacy against placebo in the treatment of depression; however, further studies need to be conducted to confirm efficacy. Saffron is developing clinical evidence as an effective antidepressant with several studies displaying positive results vs placebo and comparable efficacy vs a positive pharmaceutical control.[37] The mechanisms responsible for the antidepressant actions are posited to be mediated via reuptake inhibition of dopamine, norepinephrine, serotonin, and n-methyl-D-aspartate (NMDA) receptor antagonism.[37] Safranal, a constituent from saffron, is posited to exert selective GABA-α agonism and possible opioid receptor modulation, as demonstrated via intracerebroventricular administration in an animal model.[37,40]

SAMe is an endogenous compound produced from methionine and various methylators (eg, B_6, B_{12}, folate) in the body.[41,42] SAMe serves as a necessary methyl donor of methyl groups involved with the metabolism and synthesis of neurotransmitters.[42] In vivo studies have consistently shown that SAMe possesses antidepressant properties, and many human clinical trials using SAMe in MDD have revealed beneficial antidepressant effects comparable to synthetic antidepressants. L-tryptophan is an essential monoamine precursor required for the synthesis of serotonin and has been studied extensively in the latter half of the 20th century as an antidepressant.[43] Although many positive studies exist, only one RCT of sufficient methodological rigor using the nutrient as a monotherapy in the treatment of MDD was found to exist. Eight controlled adjuvancy studies using L-tryptophan with antidepressants, however, provide encouraging evidence, with L-tryptophan augmentation being effective in increasing the antidepressant response with phenezine sulphate, clomipramine, tranylcypromine, and fluoxetine.[44] Other clinical studies using tricyclics discovered no additional benefit compared placebo, however.

Omega-3 fatty acids may also have a role in reducing depression, especially if an inflammatory causation is present (a link between inflammation and depression has been documented).[8] Epidemiological studies have demonstrated that increased risk of depressive symptoms may be correlated with lower dietary omega-3 fish oil (eicosapentaenoic acid [EPA] and docosahexaenoic acid [DHA]).[45] Studies also have demonstrated that people with depressed mood have a tendency towards a higher ratio of serum arachidonic acid to essential fatty acids and an overall lower serum level of omega-3 compared to healthy controls.[46] Several human clinical trials have been conducted assessing the efficacy of EPA, DHA, or a combination of both.[47] Clinical evidence regarding the use of essential fatty acids as a monotherapy for unipolar or bipolar depression is equivocal, with a mixture of positive and negative trials. This may be due in part to many studies using olive oil as an "inert" control and some studies using higher DHA to EPA ratio or DHA alone. Preparations higher in EPA vs DHA in the treatment of depression may be advised, as is the use of a higher initial dosage to correct any relative imbalance to greater ratio of arachidonic acid to essential fatty acids.[44,48,49] Clinical trials using essential fatty acids adjuvantly with antidepressants have provided evidence of a greater reduction of depression level.[44] Adjuvant prescription of essential fatty acids with antidepressants can be advised in cases of deficiency or if comorbid cardiovascular or inflammatory disorders are present. Evidence currently suggests that omega-3 fatty acids exert antidepressant activity via beneficial effects on neurotransmission. This may occur via modulation of neurotransmitter (norepinephrine, dopamine, and serotonin) reuptake, degradation, synthesis and receptor binding, antiinflammatory effect,

TABLE 1 Major Evidence of Nonpharmaceutical Treatments of Depression

Intervention	Mechanisms of Action*	Key Evidence†	Summary of Results	Evidence Level	Comment
		Herbal Medicines			
St John's wort (*Hypericum perforatum*)	Modulation of serotonin, dopamine, norepinephrine transmission; cortisol-HPA-axis modulation	Meta-analyses: Linde 2008[101]; Roder 2004[102]; Werneke 2004[103]	SJW consistently demonstrates greater efficacy than placebo in treating MDD. Efficacy is equal to synthetic antidepressants	A	Observe for possible drug interaction; lower hyperforin extracts are advised to minimize drug interactions. Caution in bipolar disorder
Roseroot (*Rhodiola rosea*)	↓Noradrenaline, dopamine and serotonin depletion; Monoamine oxidase inhibition	RCT: Darbinyan 2007[39]	1 RCT: Statistically greater reduction than placebo on HDRS	B	Only one study on MDD available. More RCTs needed to validate efficacy on treating depression
Saffron (*Crocus sativus*)	↑Reuptake inhibition of dopamine, norepinephrine, serotonin; NMDA receptor antagonism; GABA-α agonism	RCTs: Akhondzadeh 2004, 2005[105,106]; Noorbala 2005[104]	3 RCTs: more effective than placebo; equivalent efficacy to synthetic antidepressants	B	Saffron extract may be expensive. Use of petals may be an option
		Nutrients			
Omega-3 fish oil	Modulation and increase of neurotransmitters; benefits neurotransmissionvia ↑cell fluidity; reduces inflammation	Meta-analyses and reviews: Lin 2007[107]; Appleton 2006[108]	Two meta-analyses of 9 and 8 studies respectively revealed positive results. Most positive studies included were adjuvant trials. Several recent equivocal RCTs using monotherapy omega 3 exist	**C**	The balance of evidence suggests limited efficacy as a monotherapy for MDD. Can recommend in deficient states or in comorbid inflammatory conditions or CVD or adjuvantly with antidepressants
L-tryptophan	Required for conversion into serotonin via intermediary step to active form 5-HTP	Systematic review and meta-analysis: Shaw 2002[43]; Positive augmentation studies by Coppen 1963[109]; Glassman 1969[110]; Wallinder 1976[111]	Tryptophan augmentation with MAOIs, SSRIs, and some TCAs is effective in increasing the antidepressant response: no difference occurred, however, compared to placebo with other tricyclics	**B**	May be of use in subjects taking antidepressants, in tryptophan deficiency, or in depression caused by serotonergic pathway dysregulation. High dosage may cause adverse reactions
S-adenosyl methionine (SAMe)	Influences metabolism and synthesis of neurotransmitters as a necessary methyl donor of methyl groups (folate, B_{12})	Meta-analysis and reviews: Papakostas 2003[112]; Williams 2005[42]	Intramuscular and oral augmentation of SAMe with antidepressants has demonstrated ↑ response and remission rate; enhances response in antidepressant nonresponders	**A**	Parenteral administration may be more efficacious than oral administration. Caution in bipolar patients; may interact with serotonergic antidepressants; expense may be a caveat
		Physical Techniques (Major Interventions)			
Acupuncture	Opioid pathway modulation; increased release of serotonin and norepinephrine; Cortisol HPA-axis modulation	Meta-analyses and reviews: Leo 2007[115]; Wang 2008[114]; Smith 2010[113]	Significant effects on HDRS against control (sham acupuncture, waitlist), equivocal efficacy versus tricyclic antidepressants	**C**	Generally positive results, although Wang et al 2008 found no effects on depression response or remission rate in four high-quality trials
Exercise (aerobics, weights, yoga)	Increase in circulating ϐ–endorphins, anandamide, and various neurotransmitters; increases tryptophan hydroxylase; odulates the HPA-axis; Enhances cerebral blood flow	Exercise: Doyne 1987[117]; Lawlor 2001[116]; Dunn 2005[99]; Yoga: Pilkington 2005[69]	Aerobic exercise, weights, and yoga, more effective in reducing depression vs no treatment or waitlist control. Large effect size noted in Lawlor and Hopker 2001 meta-analysis	**A**	All modes of physical activity have antidepressant effects. Higher-intensity exercise and weights appear to have the greatest antidepressant effect. More studies are required for yoga

TABLE 1 Major Evidence of Nonpharmaceutical Treatments of Depression, continued

Intervention	Mechanisms of Action*	Key Evidence†	Summary of Results	Evidence Level	Comment
Psychological Techniques (Major Interventions)					
Cognitive behavioral therapy; Interpersonal skills; Psychoeducation	Enhances neuronal plasticity; modulation of limbic brain center activity; increased serotonin and GABAergic effects; brain imaging shows post-treatment activity in temporal lobe, hippocampal, and cingulated areas	Meta-analyses and reviews: Cuijpers 2008[118]; Bell 2009[77]; Donker 2009[70]; Wolf 2008[17]	RCTs consistently show psychological interventions to be effective in reducing depression; evidence supports the longer term effects carry on after treatment is ceased	A	Important intervention for depression with a psychological or external life stressor trigger. Referral may be required to qualified psychologists in higher levels of depression or pronounced distress

Level A: meta-analyses or 2 or more RCTS with positive results; Level B: more than 2 RCTS, mainly positive results; Level C: nonreplicated RCT or mixed evidence from several RCTs. Abbreviations: HPA, hypothalamic-pituitary-adrenal; SJW, St John's wort; MDD, major depressive disorder; RCT, randomized controlled trial; HDRS: Hamilton Rating Scale for Depression; NMDA, N-Methyl-D-aspartate; GABA, γ-Aminobutyric acid; CVD, cardiovascular disease; 5-HTP, 5-hydroxytryptophan; MAOI, monoamine oxidase inhibitors; SSRI, selective serotonin reuptake inhibitor; TCA, tricyclic antidepressant. *See article text for references. †First author of study included.

and the enhancement of cell membrane fluidity.[50-52]

The use of acupuncture to treat depressive disorders has been documented in traditional Chinese medical texts.[53] Reviews and meta-analyses of small randomized controlled trials indicate that acupuncture can significantly reduce the severity of depression on the Hamilton Depression Rating Scale (HDRS)[54] or Beck Depression Inventory (BDI).[55] Significant effects on reducing depression occurred compared to nonspecific or sham acupuncture or massage, while equivocal efficacy compared to tricyclic antidepressants also was revealed. It should be noted that not all studies are positive and that the poor methodology used in many studies preclude acupuncture as having a higher level of evidence. Further, due to methodological challenges (eg, blinding and a strong placebo effect from sham acupuncture points), it often is difficult to draw definitive conclusions. Acupuncture has been documented to interact with opioid pathways, and substances that modulate these pathways have been shown to have antidepressant activity.[56] Other possible antidepressant mechanisms of action include increased release of serotonin and norepinephrine and cortisol modulation.[57]

Lifestyle. General lifestyle advice should focus on encouraging a balance between meaningful work, adequate rest and sleep, moderate exercise, positive social interaction, and pleasurable hobbies. Dietary programs designed to treat depression have not been rigorously evaluated to date; however, cross-sectional studies by Akbaraly et al[58] and Jacka et al[59] have revealed that a healthy diet rich in complex carbohydrates, fruits and vegetables, and lean meats and low in processed foods reduces the risk of depression. Although evidence supporting specific nutritional advice is currently lacking, a basic balanced diet including foods rich in a spectrum of nutrients can be recommended. Among important nutrients for neurochemical function, adequate folate consumption is vital. Folate is involved with the methylation pathways in the "one-carbon" cycle, responsible for the metabolism and synthesis or various monoamines, and notability involved with the synthesis of SAMe.[41] Higher rates of folate deficiency have been found in people with depressive disorders compared to their nondepressed counterparts.[60,61] Foods rich in omega-3, L-tryptophan, B and C vitamins, zinc, and magnesium are recommended, as they are necessary for the production of neurotransmitters and for neuronal communication.[62] These include whole grains (zinc, magnesium, B vitamins) lean meat (zinc, magnesium, protein, eg, tryptophan), deep-sea fish (essential fatty acids), green leafy vegetables (vitamin C, folate), colored berries (vitamin C, antioxidant phenolic compounds), and nuts (monounsaturated fats, vitamin E, zinc, magnesium).[63] A strong causal link between substance or alcohol abuse/dependence and MDD has been established, and depression, in turn, increases the risk of substance and alcohol misuse.[64,65] In such cases, supportive advice on curtailing the use of alcohol or recreational drugs and/or referral to an appropriate treatment program can be provided.

Increasing physical activity is advised if the patient has a sedentary lifestyle and is especially indicated in cases of obesity. Associations between greater physical activity and improved mood and well-being have been documented.[66,67] As is indicated in Table 1, many RCTs have revealed that exercise is effective in reducing symptoms of depression, with meta-analyses of clinical studies of exercise showing a significant effect in favor of physical exercise compared with control conditions (routine care, waitlist, meditation/relaxation, or low-intensity exercise).[68] Evidence also exists for the use of yoga to reduce depression and improve mood, with several RCTs revealing mostly positive results.[69] The methodologies were, however, commonly poorly reported, and therefore these interventions cannot currently be considered as "gold-standard" grade A–level evidence. The biological antidepressant effects of exercise include a beneficial modulation of the HPA-axis, increased expression of 5-HTP, and increased levels of circulating testosterone (which may have a protective effect against depression).[67,68]

Psychological. Psychological intervention is an important component in treating depression. Psychological techniques may be employed in practice by clinicians, although in cases of lack of expertise on the part of the clinician or marked psychological dysfunction in the patient, referral to a clinician with an adequate level of qualification and experience in psychology is advised. Basic "psychoeducation" should always be offered to the patient initially, providing an overview of the basics of depression, possible triggers, and treatment options.[70] This may empower the patient by giving him or her more insight into the condition.

MDD treatment guidelines often support the use of psychological interventions such as CBT and IPT in mild depression over synthetic medication.[2,16,17] CBT and IPT are accepted psychological interventions, both having a similar grade-A level of evidence in the treatment of MDD. CBT involves learning cognitive skills to reprogram or replace erroneous or negative thought patterns with positive balanced cognitions and to institute positive behavioral modifications.[71] The theory is based on the concept that negative, critical, and erroneous thought patterns provoke deleterious emotional and physiological responses. Intervening before this cascade occurs and establishing a positive balanced inner dialogue can prevent this spiral. The modification of cognitive biases also may have a biological benefit by reducing a reactive response from the amygdala and reducing an upregulation of the HPA-axis, which, if chronic, increases cortisol, which has a harmful effect on neurogenesis via inhibition of brain-derived neurotropic factor.[72,73]

Mindfulness techniques also may be beneficial as they can prevent rumination on past problems or future concerns.[74] The use of mindfulness has a rich history in Eastern meditative practices,[75] and the teaching of simple meditative techniques such as coordinated breathing and mental focus on the present (environment, bodily sensations, breath, current emotions) may have a place in an integrative model. Mindfulness techniques also can be applied in the context of relaxation therapy. A meta-analysis of relaxation therapies has revealed a greater effect than placebo in reducing depression (small clinical effect), although it was found to be less effective than psychological interventions such as CBT.[76] Teaching problem-solving skills also may be of benefit, especially in patients with external circumstances that are creating stress and impacting mood.[77] Other techniques such as emotion-focused therapy, self-system therapy, cognitive control training, and positive psychotherapy also may be of assistance.[78] Psychological techniques may alter biological processes, with CBT and IPT being found to modulate limbic activity (especially the hippocampus and amygdala), enhance neuronal plasticity, and exert effects on GABAergic and serotonergic pathways.[79-81] Posttreatment brain imaging has demonstrated that these interventions may increase activity in the left temporal lobe and hippocampal and cingulated areas.[79, 80]

Social. Evidence consistently suggests that familial or environmental factors such as present or early childhood traumatic events and acute stressful events or chronic exposure to stress can increase risk of a depressive episode.[9,12] Though cognitively-focused psychological techniques may be effective interventions, social elements may need to be specifically addressed in some patients. Evidence consistently reveals that social isolation and reduced social contact is depressogenic.[82] This may cause or exacerbate an episode, and depression, in turn, may prompt a lack of social engagement, thereby prolonging and worsening the episode. Support networks are crucial, with social units (family and friends) having a profound impact on mental health (providing emotional nourishment and support). The clinician is therefore advised to consider transpersonal elements that may be affecting the patient's mental health. In such cases, a family-focused counseling model may be of assistance. The social conflict model suggests that a perceived attack to a person's self-esteem may undermine his or her place in the social hierarchy and perceived hopeless situations may provide a powerful trigger for a depressive episode.[83] The teaching of assertiveness, recognition of healthy social boundaries, and general communication skills may provide the tools necessary to improve social relations, and to mitigate transpersonal challenges.[78]

TABLE 2 Specific Clinical Foci in Treating Depression

Possible depressive trigger (causation or exacerbating factor)	Initial primary treatment foci
Biological/genetic (no discernible psychosocial/lifestyle trigger)	Antidepressant CAM: *Hypericum perforatum*, S-adenosyl methionine, L-tryptophan or 5-HTP, acupuncture
Life event (eg, bereavement, crisis)	Psychological support: counseling, problem solving
Abusive family/social dynamic Poor social skills Unemployment	Psychosocial techniques: interpersonal therapy, problem solving, assertiveness training, family-focused therapy, referral for social support and networks, employment services
Negative cognitions	Psychological techniques: cognitive therapy, behavioral therapy, psychotherapy
Poor diet Diet low in omega-3 or folate	Dietary advice: adequate levels of fruit, vegetables, complex carbohydrates, omega-3 fish oils, lean meats; lower saturated fats and refined carbohydrates. Supplement with folic acid, EPA/DHA blend (if deficient)
Obesity Sedentary lifestyle	Exercise plan: graded approach increasing in intensity, 3-5 d/wk, with social interaction if possible
Circadian rhythm factors (lack of sunlight, poor sleep)	Wake/Sleep cycle alteration: sleep hygiene, light therapy in the morning, exercise, avoidance of stimulants
Comorbidities (medical) (substance abuse/dependency)	Referral: medical doctor for clinical examination and appropriate tests; substance abuse/dependency clinic, clinical psychologist

Some people may find IPT beneficial. IPT can be used to identify problem social situations that are depressogenic and to develop transpersonal techniques (such as social skills) to manage relationships.[84] By increasing confidence and competency in managing social interactions, a robust sense of self-esteem may develop. This approach may involve supportive group therapy, which is increasingly occurring via the Internet (a method with emerging supportive evidence).[85] Referral to CBT Internet programs such as MoodGYM (www.moodgym.anu.edu.au) provide a low-cost option for patients with Internet access. Unemployment also increases the risk and duration of a depressive episode,[86,87] so discussion of the patient's employment status in the therapeutic consultation and if appropriate, a referral (eg, to employment agencies) also may be of assistance.

Spirituality is another important facet of the transpersonal element of the social component of the model that could potentially be termed a "biopsychosocio-spiritual" model. Religiosity and spirituality may provide a protective effect against depression.[14] Though religion is a sensitive area (and should perhaps be left outside the therapeutic domain), the clinician can encourage patients to explore their spirituality and find existential meaning in the challenges of their depression. Another transpersonal element that may provide a simple euthymic effect is the act of altruism or kindness. Though people with significant depressed mood may find it difficult to engage in social connection, acts of helping others may increase self-esteem and provide a euthymic distraction from their melancholy.[14]

Clinical Considerations and Application of the Model

From a clinical perspective, the goal of treating depression is to ameliorate the depression as quickly and safely as possible. During initial case taking, the clinician needs to assess the severity of the depression (ie, mild, moderate, or severe). The *Diagnostic and Statistical Manual of Mental Disorders-IV* (*DSM-IV*) assessment criteria can be used to diagnose MDD,[2] while an assessment scale such as HDRS may be used to determine the severity. An initial focus of case taking is to screen for suicidal ideation or plans to commit suicide. This is a major concern as suicide is a devastating potential consequence of MDD.[88] If suicidal ideation is significant or if self-harm is a distinct possibility at any stage, referral to a medical practitioner or to an emergency ward of a hospital for immediate psychiatric assessment is crucial.

To treat depressed mood effectively, it helps to understand the biological, psychological, and sociological factors that are involved. As causations of depression are multifaceted, individual presentations vary markedly. The initial case-taking process is important to assess the causations of the depressive pattern (within a biopsychosocial framework); when the first episode occurred; the number of discrete episodes; the severity; what may trigger an episode (eg, anniversary of a death, change in the weather); maintaining factors that may exacerbate or prolong the episode (eg, ill health, chronic stress, unemployment); and what alleviates the depression. Comorbid medical conditions also may be causative factors of depression (and comorbid anxiety) and need to be screened for (eg, hypothyroidism, inflammatory disease, cancer, sleep disorders, heart or metabolic disease, or other psychiatric disorders).[89,90] Certain medications, such as corticosteroids, also may be implicated.[91] Substance or alcohol misuse also needs to be screened for, as this is commonly involved in the pathogenesis of depressed mood and also often occurs in depressed individuals who are trying to "self-medicate."[65]

After thorough case taking, an individual tailoring of the prescription (within the financial means of the patient) is vital to address the specific underlying causes of the depression, thus assisting in compliance and recovery. After initial case taking and prescription, a follow-up appointment (approximately 1 week later if possible) is especially important not only to monitor for any lowering of mood but to ensure compliance, check for adverse reactions, and provide a supportive therapeutic role. At this time, the prescription can be modified accordingly, more elements of the ALPS model applied, and additional case-taking detail pursued. At any point of the therapy referral may also be required, as even the most skilled practitioners often cannot offer all the therapeutic interventions required to effectively treat the patient. Due to this, judicious referral may be of benefit for interventions such as psychology, acupuncture, social work, or exercise instruction.

Figure 3 outlines a decision tree that may help in providing the clinician with a stepwise framework to treat MDD. The clinical decision of which interventions from the ALPS model should be used initially should be predicated upon the clinician's judgment regarding the cause(s) of and likely solution(s) for ameliorating the depressive episode. In some cases, the underlying or sustaining cause may be obvious; however, in many cases a complex interplay between factors will occur, so an integrated approach to addressing these factors is advised. Though it is possible to develop a systematic approach based on an algorithm that recommends specific treatments for specific presentations, a "whole person" approach to treatment is usually a complex and individualized affair; therefore, it is ultimately up to the clinician—with the patient's consent—to determine which interventions may be used and in what order they can be applied.

Inquiring about what has previously been beneficial in ameliorating the patient's depressive symptoms may provide the most obvious signpost to potentially beneficial treatments. This may be reinstituted or adjusted as present considerations may require. Regardless of the clinician's proposed treatment plan, it is important to give the patient a degree of the locus of control on the preferences and direction of his or her treatment. This may foster self-empowerment and self-reliance. It is also important to ensure that the treatment plan is aligned with the patient's belief system. While a holistic integrative approach is advocated in this article, it is important not to overburden the patient with a myriad of interventions, as this may exacerbate the depressive episode. The most applicable primary intervention(s) can be instigated initially, and then over time other treatments can be offered at a pace that is comfortable for the person. There is growing evidence of the efficacy of this "stepped-care" approach, and although it is more costly, it has revealed improved outcomes

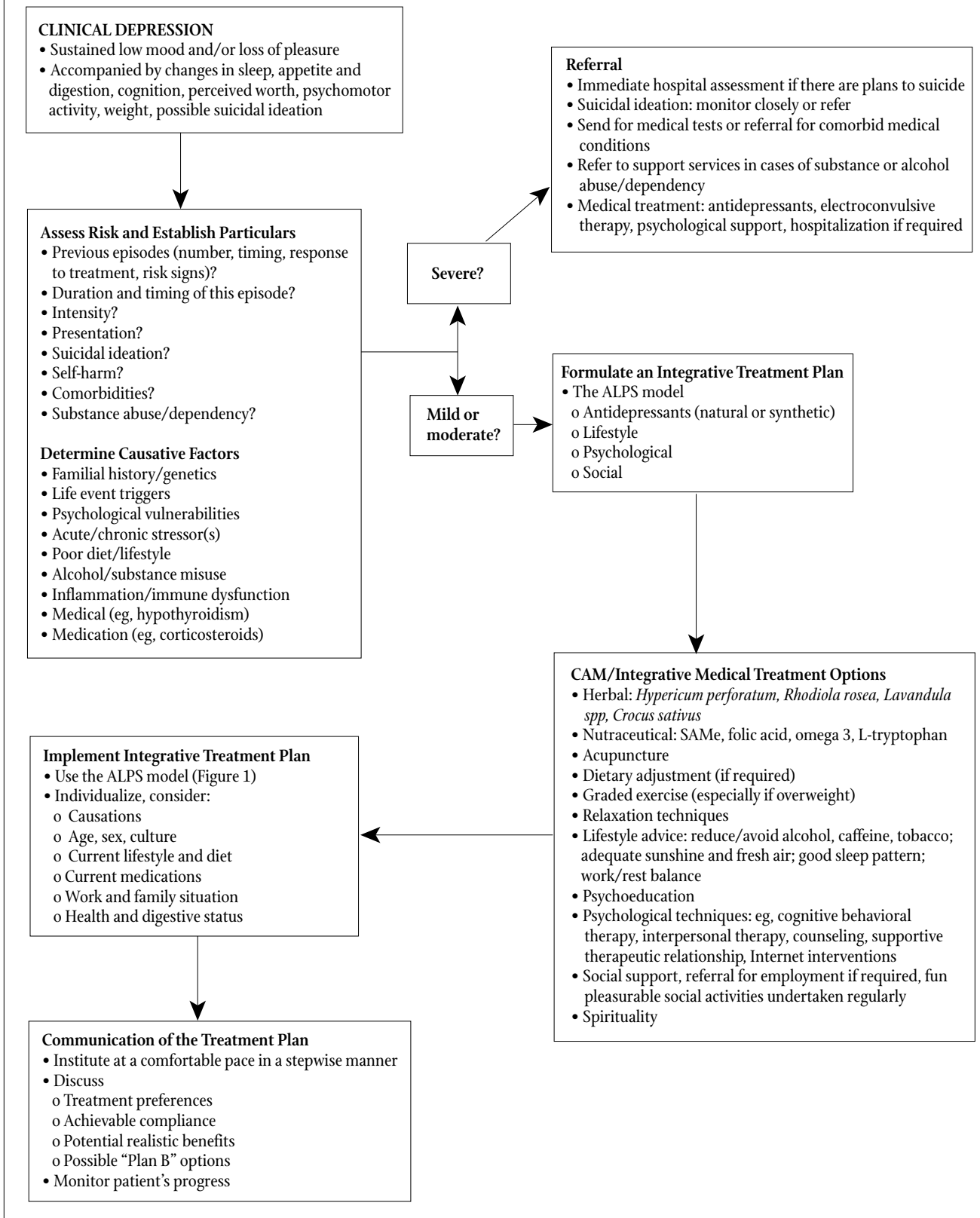

FIGURE 3 Clinical Depression: Treatment Decision Tree

over usual treatment.[24,92] In many cases, the use of a biological intervention (eg, SJW or SAMe) as a standard approach may be considered, as taking a pill may not be as onerous for some as embarking on dietary modification, reducing alcohol, initiating exercise, or engaging in psychotherapy.

An important consideration regarding prescription of CAM products concerns quality, safety, and dosage levels. Prescribed herbal medicines products should be from trusted companies that manufacture them according to pharmaceutical standards, standardizing the product for active constituents where possible. Safety considerations involve potential drug-herb/nutrient interactions and side effects; thus, people prescribing herbal medicines should have adequate qualifications in this area. Dosages for CAM products are often debated and may be influenced by the type and quality of a product; the patient's weight, age, and metabolism; and modifying factors such as current medication, comorbid disease, or genetics. Ideally, adequate vitamins and minerals will be sufficiently found in the diet, and if not, supplementation with nutraceuticals can be considered. It should be noted, however, that in the case of folic acid, supplementation studies have shown a slight increase in cancer rates.[93] The 5-methyltetrohydrofolate (5-MTHF) form may be safer to use in major depression.[93]

Various interventions may be of use adjuvantly to address co-occurring conditions or complications; these include the hormone DHEA in the case of low androgens, therapeutic massage for comorbid muscular tension and pain, and omega-3 fish oils in comorbid inflammatory and cardiovascular conditions.[14,47,94] Evening doses of L-tryptophan or 5-HTP (with relevant cofactors, eg, B_6, B_{12}, folate, magnesium) may be of benefit in cases of depression with co-occurring insomnia.[47] In such cases, sleep hygiene techniques may also be of assistance,[95] in addition to relaxation techniques, morning light therapy (primarily in seasonal affective disorder),[96] and yoga.[69,97]

Prescriptive considerations regarding exercise are important, as increased physical activity may have negative health consequences, especially in people with comorbid medical conditions such as heart disease or arthritis.[98] Evidence currently favors anaerobic over aerobic activity to gain the greatest benefits, and the intensity needs to be moderate to high and performed two to three times per week.[99] Clinicians should be aware that depression may be worsened if the person is unable to meet high expectations regarding level and frequency of exercise, potentially promoting a sense of failure and guilt. This may be more likely to occur in severe MDD, especially where psychomotor retardation, hypersomnia, somnolence, marked fatigue, or anhedonia are present. Exercise plans should be instituted after a medical assessment and initially commenced at a low intensity to allow for physical and psychological adaptation to occur to the new stimulus.[68] Clinical considerations regarding dietary modification also should be observed. Though general dietary advice on healthy eating is benign, modifying factors such as vegetarian/veganism, current nutritional deficiencies, eating disorders, pregnancy, the age of the patient, and cultural factors need to be considered. Finally, important advice sometimes overlooked by clinicians is to encourage exploration of fun activities in the patient's life. Pleasurable euthymic activities (especially involving social contact) offer a powerful antidote to life's stressors.

DISCUSSION

As a review of the literature details, in the treatment of clinical depression, many nonpharmaceutical options with grade A– or B–level evidence exist. The ALPS model may provide a clinical framework to apply these interventions in practice. It is noted, however, that though the individual interventions have RCT evidentiary support, the overall model using a combination of these treatments has not yet been clinically validated. This remains a key area of future research and reflects an overall methodological challenge for the area of CAM: to test holistic models as practiced by clinicians using sound methodology. Though RCTs are vital in validating individual therapeutic interventions, it is an important step in the evolution of CAM research to move beyond reductive methodology. Options may include a "whole systems" research format,[100] whereby evidence-based components are combined into an individualized treatment package that can be disseminated to patients according to a systematic clinical decision tree. This decision tree could provide an algorithm whereby certain presentations could "trigger" treatment options and could be achieved in part by information elicited from an interview form based on this algorithm (in addition to personalized case taking). In a clinical trial, this could be compared to treatment as usual, conventional pharmacotherapy, or a waitlist or placebo arm, with assessment being performed by blinded independent researchers who perform the assessments with no knowledge of the study particulars.

A potential drawback with multiple interventions is increased cost (eg, healthy foods, gym memberships, psychologist/counseling, CAM products), while physical discomfort and/or injury may in rare instances occur with exercise or acupuncture. While these limitations and weaknesses are acknowledged, strengths exist in the creation, study, and implementation of an integrative model. It is hoped that the tailored combination of treatments would be effective in the treating depression, with potentially fewer side effects than conventional pharmacotherapies. Importantly, this approach may provide a sustained long-term effect, thus increasing long-term remission of MDD. This may be especially so when psychological techniques are employed, dietary advice is adhered to, exercise is incorporated into the person's daily routine, and social skills (where warranted) are taught to increase resilience and enhance self-esteem. The ALPS depression treatment model can be employed by CAM or allied health practitioners (eg, nurses, clinical psychologists) or medical physicians as a stand-alone model, or it can be applied in conjunction with antidepressants as an adjuvant.

In conclusion, the future of clinical research into depression needs to provide a greater emphasis on integrative working models. The next step is to design a detailed comprehensive treatment algorithm and trial methodology to study the ALPS depression treatment model within a rigorous methodological framework.

Acknowledgments

Sincere thanks to Dr James Lake from The International Network of Integrative Mental Health (www.INIMH.org) for his erudite input into the manuscript. Dr Jerome Sarris is funded by an Australian National Health and Medical Research Council fellowship (NHMRC funding ID 628875), in a strategic partnership with The University of Melbourne and the National Institute of Complementary Medicine at Swinburne University of Technology, Melbourne.

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Modifiable Disease Risk, Readiness to Change, and Psychosocial Functioning Improve With Integrative Medicine Immersion Model

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Background • Stroke, diabetes, and coronary heart disease (CHD) remain leading causes of death in the United States and are largely attributable to lifestyle behaviors. Integrative medicine can provide a supportive partnership that focuses on improving health by identifying and implementing lifestyle changes based upon personal values and goals.

Objective • This prospective observational study was designed to assess the effectiveness of an integrative medicine intervention on modifiable disease risk, patient activation, and psychosocial risk factors for stroke, diabetes, and CHD.

Design • Sixty-three adults participated in a 3-day comprehensive, multimodal health immersion program at Duke Integrative Medicine, Duke University Medical Center, Durham, North Carolina. Participants received follow-up education, physician support, and telephonic health coaching between the immersion program and the endpoint 7 to 9 months later.

Primary Outcome Measures • Psychosocial functioning, readiness to change health behaviors, and risk of developing diabetes, stroke, and CHD were assessed at baseline and endpoint.

Results • Although cardiac risk remained unchanged ($P = .19$) during the study period, risk of diabetes ($P = .02$) and stroke ($P < .01$) decreased significantly. Perceived stress remained unchanged, but improvements were seen in mood ($P < .05$) and relationship satisfaction ($P < .004$). Patients became more activated towards self-management of health ($P < .001$), endorsed greater readiness to change health behaviors ($P < .01$), and reported increased aerobic exercise ($P < .001$) and stretching ($P = .006$) following the intervention.

Conclusion • An integrative health model can help patients become more engaged in self-management of health and support them in making and maintaining healthy lifestyle changes. These findings provide support for use of an integrative health model in adult disease risk reduction. (*Altern Ther Health Med.* 2011;17(4):38-47.)

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Stroke, diabetes, and coronary heart disease (CHD) remain leading causes of death in the United States[1] and are largely attributable to behavior.[2-4] Expert recommendations for disease risk reduction include increasing physical activity, moderating caloric intake, and reducing stress.[5-8] Nonetheless, inactivity remains pervasive in the United States, with as much as 62% of the population not participating in any vigorous activity in the span of a year.[9] Caloric intake has increased steadily over the past 3 decades,[10] and the resulting imbalance between caloric intake and energy expenditure has resulted in an increased rate of obesity and excess weight.[1] In addition, a large segment of the population reports negative psychosocial factors—chronic stress, negative mood, and low levels of social support—that contribute to risk of stroke, diabetes, and CHD.[11-14]

Prospective trials have clearly demonstrated that improvements in diet[15] and exercise[16] can have a profound impact upon

markers for disease risk. Furthermore, recent studies have shown that alternative approaches to stress reduction such as yoga[17,18] and meditation[19-21] can likewise influence chronic disease risk. Research has shown that improving health behaviors can lead to improvement in overall health and well-being; however, individuals desiring to better their health often face obstacles when it comes to initiating and maintaining changes in behavior. An integrative health model may help overcome these hurdles through supportive patient partnerships that focus on identifying and implementing lifestyle changes based upon personal values and goals. Integrative health professionals trained in coaching can support and promote this process by building trusting relationships with patients that encourage personal growth, enhance motivation, and promote self-efficacy.[22]

There has been only limited investigation into the effectiveness of a patient-centered program that combines multiple strategies into a whole-person paradigm for disease risk reduction.[23,24] Accordingly, the aim of the current study was to evaluate patient outcomes from an integrative health program designed to provide holistic, patient-centered care and incorporate conventional and complementary medicine approaches for the reduction of chronic disease risk.

METHODS

Study Design

A prospective observational study design was used to assess changes in modifiable disease risk, patient activation, and behavioral and psychosocial measures after an integrative medicine health program. This program included two principal components: a 3-day health immersion phase conducted at an academic integrative medicine facility and a support phase consisting of telephonic health coaching and monthly didactic sessions on health topics. The research protocol was approval by the Duke University Medical Center Institutional Review Board.

Participants

Participants included 63 individuals (33 male and 30 female) who provided written informed consent and attended a discounted, self-paid 3-day health immersion program at Duke Integrative Medicine. Participation was limited to members and employees of an early retirement community in South Carolina, all literate in English and 18 years of age or older. Individuals were excluded if they were pregnant, had severe psychiatric disease, a cognitive impairment (eg, dementia, Alzheimer's disease), or other conditions that would limit their ability to provide informed consent.

Intervention

Phase I: 3-day Health Immersion. During the health immersion, participants spent 3 days at the Integrative Medicine center, participating in a variety of conventional and complementary therapies including nutritional counseling, acupuncture, massage, exercise training, yoga, and mind-body therapy (Table 1). Classes and individual consultations focused on topics identified on the Duke Integrative Medicine (IM) Wheel of Health (Figure 1).[25] This model centers on mindfulness and includes topics related to both professional care (eg, pharmaceuticals/supplements, preventive medicine, and conventional/CAM treatments) and self-care (eg, mind-body connection, movement/exercise, nutrition, physical environment, relationships, and personal growth/spirituality). A team of health care providers worked with each participant individually to develop a personalized health plan[26] corresponding to the 10 integral areas of health identified on the Wheel of Health (Figure 1). During the 3 days, participants also met with health coaches to reflect on personal goals and values as well as to refine and implement the health plan. Thus by the end of the immersion, participants had established a comprehensive multimodal plan for implementing lifestyle changes.

Phase II: Support Phase. After completing the health immersion, participants were provided with follow-up integrative health coaching (IHC) by telephone. IHC is a relatively recent addition to the field of coaching.[22] The IHC model builds upon elements of life coaching such as appreciative inquiry[27] and motivational interviewing[28] and in addition helps patients explore motivation to move toward whole-person health as conceptualized by the Wheel of Health (Figure 1). Specifically, IHC strives to link desired lifestyle changes with personal values and mission.

Masters-level professionals trained in IHC performed the

TABLE 1 Duke Integrative Medicine Three-day Health Immersion Program

1. Introduction to Integrative Medicine, information on the Three-day Health Immersion program, description of personalized health planning, and explanation of the Duke Integrative Medicine Wheel of Health
2. Individual integrative physician consultations
   - New patient consultation on day 1 (80 min)
   - Follow-up consultation on day 3 (30 min)
3. Health coaching
   - Three group coaching sessions (50 min each) or one individual coaching session via phone (90 min)
4. Individual fitness assessment (60 min)
5. Individual manual therapies
   - Acupuncture or acupressure (60 min)
   - Massage (60 min)
6. Group movement classes
   - Yoga (60 min)
   - Qigong (60 min)
7. Nutrition consultation and education
   - Individual integrative nutrition consult with registered dietician (60 min)
   - Nutrition class: In Search of the Optimal Diet (60 min)
8. Healthful cooking class (60 min)
9. Individual mind/body consultation (60 min)
10. Group mindfulness classes
    - Introduction to mindfulness-based meditation (60 min)
    - Mindful-eating lunch (60 min)
11. Program conclusion and final reflection (group setting)

All subjects participated in the above health-related activities during a 3-day period between January and March 2008.

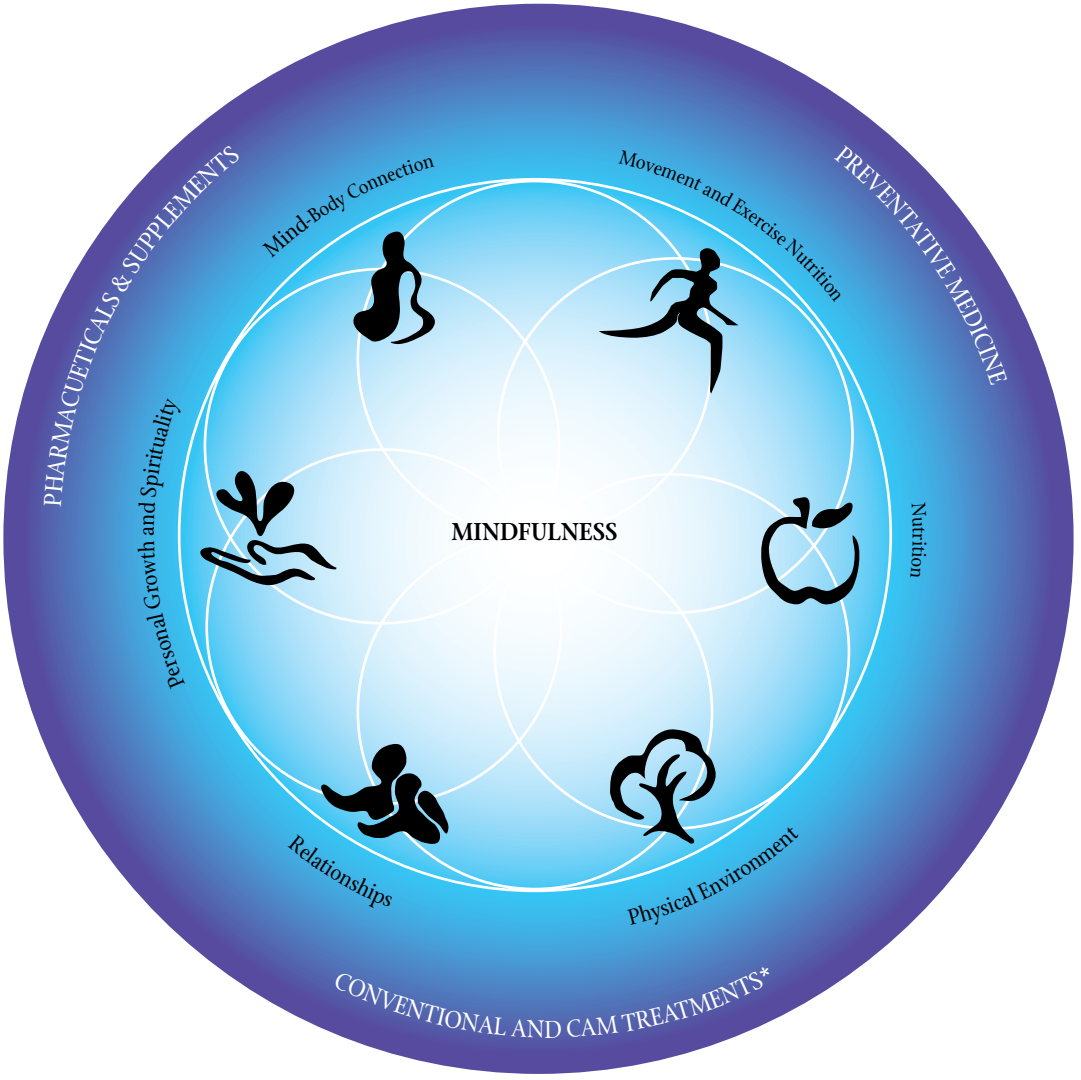

FIGURE 1 Duke Integrative Medicine Wheel of Health

Used with permission from Duke Integrative Medicine for the Wheel of Health. © 2006 Duke University for Duke Integrative Medicine.

health coaching and provided participants with support and guidance in implementing their personalized health plans. The support phase included five 30- to 40-minute one-on-one phone calls during the 31- to 37-week period. Participants initiated calls at agreed-upon times convenient to both coaches and participants. Within the first 2 months of the support phase, participants also were offered a 30-minute phone consultation with their integrative physicians. This phone call provided an opportunity for physicians to address patient questions, update participants on baseline lab results, and explain results from Know Your Number (KYN) disease risk assessments (Biosignia, Inc, Durham, North Carolina; see Measures). Participants also were provided with eight monthly education lectures that were delivered in person by Duke IM clinicians in the participants' home communities. Lectures provided general preventive health education and further expanded upon the Wheel of Health concepts learned in the 3-day health immersion program (Table 2).

Measures

Disease Risk. Primary outcomes included 5-year risk of developing diabetes, stroke, and CHD, as estimated by the KYN disease assessment tool. The KYN tool calculates disease risk using a multivariate, meta-analytic disease model that incorporates biological measures and information provided by a comprehensive patient

TABLE 2 Group Education Sessions Provided During the Support Phase

1. A Healing Journey Through Cancer: Integrative Medicine Approaches for Prevention and Treatment
2. Maximize Back, Joint, and Muscular Health
3. A Woman's Midlife Health Journey: Embracing Perimenopause and Menopause
4. When Working Out Hurts: Alternative Treatments for Pain Management and Relief for Sports and Exercise-related Injuries
5. Integrative Medicine Strategies for Optimal Living: Approaches to the Prevention and Treatment of Cardiovascular Disease
6. Give Yourself Health: The Power of Your Mind/Body Connection
7. In Search of the Optimal Diet
8. Emotional Wellness: How Emotions Affect Your Health and Well-being

questionnaire (demographics, disease history, family history, and behavioral measures; Table 3).[29,30] The model provides estimates of relative risk (5-year absolute risk relative to a peer group matched for age and gender), modifiable risk (level of 5-year risk that can be altered by behavior), and absolute risk (probability of disease expression within 5 years). The KYN patient questionnaire was completed online within the 2 weeks preceding the health immersion (baseline) and during the 2 weeks before the follow-up appointment 7 to 9 months later (endpoint). The biological measures included in the KYN profile were collected in a fasting state on the first day of the immersion and again at the follow-up appointment. Approximately 2 weeks after baseline and endpoint, participants received information on their 5-year disease risk.

Biological Measures. Biological outcome measures included blood pressure (BP), resting pulse, height, weight, body composition, body mass index (BMI), waist circumference, fasting glucose, lipid profile, and high sensitivity C-reactive protein (CRP). BP was measured on the left arm, using a manual sphygmomanometer.[31,32] Participants were directed to sit quietly for 5 minutes before the first measurement. The radial pulse was taken for 30 seconds after completing the BP, and a second BP and pulse were taken 2 minutes later. Height was measured twice consecutively. Duplicate measurements of pulse, blood pressure, and height were averaged. Body weight was taken on a Tanita Scale (TBF-310GF; Tanita Corporation, Arlington Heights, Illinois) with participants in light indoor clothing and without shoes; participants were asked to fast 12 hours prior to measurements and void before weighing. Body mass index was calculated as weight in kg divided by height in meters squared. Waist circumference was measured in triplicate and averaged according to the method used by Canoy et al.[34] All blood samples were collected after participants had fasted for 12 hours. Blood assays were carried out by the Clinical Laboratory Improvement Amendments–certified Duke University Health System core laboratory.

Self-reported Psychosocial Measures. ***Burns Brief Mood Survey (BMS).*** The BMS[35] includes three five-item subscales for assessment of depression, anxiety, and anger during the previous 1-week period. The BMS has been shown to be valid and reliable.[35-37] In the present study, Cronbach's α for anger, anxiety, and depression subscales were 0.82, 0.85, and 0.90, respectively.

Relationship Satisfaction Scale (RSAT). The RSAT assesses the level of satisfaction or dissatisfaction felt by the participant in reference to their closest personal relationship; it was selected for the current study as an indicator of social support. This five-item scale demonstrates good convergent and discriminate validity.[35] Responses were measured on a Likert scale with anchors of satisfied and dissatisfied. Cronbach's α was 0.97 in the present study.

TABLE 3 Know Your Number Disease Rick Components*

Risk Factor	CHD	Stroke	Diabetes
Age	■	■	■
Gender	■	■	■
Ethnicity	■	■	■
Diagnosed with CHD	■	■	
Previous stroke	■		
Diagnosed with diabetes	■	■	
Diagnosed with LVH	■	■	
Family history of CHD	■		
Daily aspirin use	■		
Current HRT therapy	■		
BMI	■	■	■
Systolic blood pressure	■	■	■
Current smoker	■	■	■
Past smoker			■
Exercise level	■	■	■
Total cholesterol	■		
HDL	■		
C-reactive protein	■		
Diagnosed with other CVD		■	
Diagnosed with atrial fibrillation		■	
Family history of stroke		■	
Current use of hypertension medication		■	
Previous diagnosis of gestational diabetes			■
Years since gestational diabetes			■
Family history of diabetes			■
Waist measurement			■
Fasting blood glucose			■

Abbreviations: CHD, coronary heart disease; LVH, left-ventricular hypertrophy; HRT, hormone replacement therapy; BMI, body mass index; HDL, high-density lipoprotein; CVD, cardiovascular disease.
*Diabetes indicates type 2 diabetes mellitus; darkened blocks reflect variables used to calculate specific disease risks. Table content provided by Biosignia.

Perceived Stress Scale (PSS). Participants' nonspecific, self-appraised stress was measured using the four-item PSS. The PSS measures perceived stress over the past month; it has demonstrated reliability and construct validity.[38,39] Cronbach's α was 0.78 in the present study.

Behavioral Activation. ***Patient Activation Measure (PAM).*** The 13-item PAM was used to assess patients' knowledge, skill, and confidence toward self-management of health. Higher scores on this measure have consistently been associated with healthy behavior, health information seeking, and readiness to change in both healthy and chronically ill populations.[40-43] The PAM has been shown to be both valid and reliable.[41] Cronbach's α was 0.77 in the present study.

Readiness to Change (RTC). A six-item RTC questionnaire was designed for this study to assess readiness to change[44] in the areas of weight reduction, exercise, smoking cessation, diet, stress management, and meditation. The items have independently demonstrated construct validity in previous studies.[45-48]

Exercise Behavior. Exercise behavior was measured with a brief questionnaire that assessed frequency of aerobic exercise (≥20 minutes duration), stretching (≥15 minutes duration), and muscular strengthening exercise (≥20 minutes duration). Available responses included fewer than once per month, one to two times per week, three to four times per week, and five or more times per week.

Intervention Integrity Check. ***Wheel of Health Questionnaire (WHQ).*** The 20-item WHQ, designed for this study, was used to assess whether participants integrated aspects of the intervention into multiple domains of living. Measured dimensions included movement and exercise, nutrition, physical environment, relationships, personal growth and spirituality, mind-body connection, preventive medicine, conventional and CAM treatments, pharmaceuticals/supplements, and mindfulness. Performance and satisfaction in each of the 10 dimensions of the Wheel of Health were measured on a 1-to-10 scale anchored by the descriptors "low" and "high." All dimensions were summed to create subscores for WHQ performance and WHQ satisfaction.

ANALYSIS

An intention-to-treat analysis was conducted, based upon the 63 participants who were enrolled in the study, attended the 3-day immersion, and completed any assessment at baseline. The last observation was carried forward to replace endpoint values for those participants with missing data. Baseline and endpoint data were excluded (pairwise) in the cases where a participant's baseline questionnaire was incomplete. Analyses were performed using SPSS version 17 (SPSS, Chicago, Illinois). All data except for total cholesterol and HDL cholesterol were non-normally distributed as measured by the Kolmogorov-Smirnov test with Lilliefors Significance Correction and Shapiro-Wilk test ($P < .05$)[49,50]; therefore, all P-values were determined using the nonparametric Wilcoxon Signed Rank test.[51] Statistical significance was set at the $P < .05$ level.

RESULTS

Participants

Participants ranged in age from 33 to 73 years with a mean age of 59.6 (SD = 8.2). The sample was near equally divided between men and women and consisted predominantly of white individuals who reported relatively high levels of education and income. Thirty-three percent of participants had metabolic syndrome at baseline as defined by the International Diabetes Federation.[52] Descriptive statistics on the demographic characteristics of this sample are listed in Table 4.

Retention and Adherence

During the support phase, participants completed a median of two of the five available health coaching calls and used an average of 101.0 minutes of total coaching per person (50.5% of available session time). Six of the initial 63 participants were lost to contact or unavailable for the endpoint data collection.

Disease Risk and Disease Risk Biomarkers. ***Relative Risk.*** When matched for gender and age with a national sample, the median 5-year relative risk percentile at baseline was well below average at 7% (SD = 20.1%) for coronary heart disease, 16% (SD = 24.1%) for diabetes, and 25% (SD = 28.8%) for stroke.

Modifiable Risk. Five-year median modifiable risk of diabetes shifted ($P = .02$) from 0.37% (SD = 2.55%) at baseline to 0.16% (SD = 2.98%) at endpoint (Figure 2); median stroke risk decreased ($P < .01$) from 0.37% (SD = 2.09%) to 0.23% (SD = 2.32%). Median CHD risk declined from 0.95% (SD = 1.30%) to 0.72% (SD = 1.97%). Although the reduction in median CHD risk is nearly equal in magnitude to that of diabetes and stroke risk, the change in coronary risk was not statistically significant ($P = .17$) due in part to an upward shift in CHD risk variability (interquartile range of 0.23-1.73 at baseline to 0.20-1.87 at endpoint).

Absolute Risk. The change in 5-year absolute risk of diabetes was nonsignificant with a decrease in median risk from 1.28% (SD = 2.87%) at baseline to 1.06% (SD = 3.31%) at endpoint. Median absolute risk of CHD also declined slightly (nonsignificant) from 1.91% (SD = 2.42%) to 1.82% (SD = 2.96%). In contrast, the absolute risk of stroke decreased significantly ($P = .02$) from a median of 1.28% (SD = 2.87%) at baseline to 1.06% (SD = 3.30%) at endpoint.

Biomarkers for disease risk, including BMI ($P = .008$), waist circumference ($P = .003$), and pulse ($P < .001$) improved significantly across the study period (Table 5). Total cholesterol increased significantly during the study ($P = .007$). Systolic blood pressure ($P = .237$), diastolic blood pressure ($P = .095$), HDL cholesterol ($P = .109$), glucose ($P = .300$), and CRP ($P = .068$) did not change.

These data represent intention-to-treat analyses (n = 63); however, analyses including only completers (n = 57) yielded similar results (data not shown) for all outcomes measured.

Behavioral and Psychosocial. Participants experienced a highly significant increase ($P < .001$) in activation (PAM) during the study period (Table 6), and measures of psychosocial function, including anger, anxiety, depression, and relationship satisfaction, improved significantly ($P < .05$). Importantly, baseline

TABLE 4 Participant Baseline Demographics (n = 63)

Highest Level of Education	
Grade school	1 (1.6%)
High school	3 (6.3%)
Undergraduate	23 (36.5%)
Graduate	22 (34.9%)
Postgraduate	14 (22.2%)
Gender	
Male	33 (52.4%)
Female	30 (47.6%)
Ethnicity	
White non-Latino	62 (98.4%)
Other	1 (1.6%)
Age, y	
<40	1 (1.6%)
40-49	8 (12.7%)
50-59	15 (23.8%)
>60	39 (61.9%)
Marital status	
Single	5 (7.9%)
Married	55 (87.3%)
Widowed	3 (4.8%)
Annual household income	
$20 001-$50 000	2 (3.5%)
$50 001-$100 000	7 (12.3%)
>$100 000	48 (84.2%)
Work status	
Employed full-time	18 (28.6%)
Employed part-time	3 (4.8%)
Unemployed	1 (1.6%)
Retired	40 (63.5%)
Other	1 (1.6%)
Health status	
Metabolic syndrome*	21 (33.3%)

*International Diabetes Federation criteria for metabolic syndrome.

activation (PAM) in completers was not significantly correlated with change in risk of stroke (bivariate r = 0.09), diabetes (bivariate r = 0.20), and CHD (bivariate r = –0.12).

Analyses also demonstrated highly significant ($P < .001$) improvements in the median frequency of aerobic exercise and readiness to change (RTC) for stress reduction and mental focus. Strengthening exercise and exercise stage of change remained unchanged, although all other behavioral measures also improved significantly ($P < .05$) (Table 7). Finally, measures of intervention integrity, including WHQ health performance and satisfaction increased significantly ($P < .001$), as shown in Tables 6 and 7.

DISCUSSION

To our knowledge, this is the first study to evaluate an integrative health model that combines an intensive 3-day health immersion and personalized health plan with follow-up education and physician and coaching support. Integrative medicine builds upon concepts of self-determination theory and emphasizes the individual's role in health.[53] For a patient-centered program, one of the key objectives of the current intervention was to help individuals establish health and wellness goals that were based upon their own personal values. A second and equally important objective was to partner with patients in achieving self-stated goals.

Our findings indicate that although cardiac risk remained unchanged, modifiable risk factors for diabetes and stroke decreased significantly across the intervention. While the magnitude of change may appear less than significant from an epidemiological standpoint, it is notable that participants demonstrated improvements in spite of floor effects commonly observed among relatively healthy populations. In addition, multiple psychosocial and behavioral measures improved and participants became more activated towards self-management of health. Significant improvements in patient activation indicate that participants became more confident in making and maintaining healthy lifestyle changes. Importantly, baseline activation did not mediate the changes in modifiable risk. Rather, the intervention itself appears to have activated patients to change lifestyle behavior and reduce risk.

The mean BMI of participants at baseline was near the normal range at 26.8, so many patients sought to maintain an already healthy weight rather than include weight loss among their health goals. Maintenance of a healthy weight represents a clinically relevant outcome in and of itself since body mass tends to increase through the sixth decade of life and such increases are related to high absolute risk of disease and mortality.[54] Participants lost 0.9 kg (approximately 2 lbs; mean = 80.5, SD = 21.3 to mean = 79.6 SD = 21; $P = .01$) across the intervention; however, even moderate weight loss has been associated with improvements in risk factors for cardiovascular disease and diabetes.[55-57] Furthermore, each kilogram of weight loss is on average associated with a decrease in incidence of diabetes by 16%[58] and a reduction in systolic blood pressure of 1.0 to 2.4 mm Hg.[59]

While short-term improvements in KYN disease risk measures may appear modest, the KYN model did not account for the potential long-term benefits that can result from reduced anger, anxiety, and depression and increased social support. Such psychosocial and quality of life measures have shown utility in predicting future health status and mortality.[60,61] High levels of anger, anxiety, and depression have been associated with risk of cardiovascular disease[62] and stroke.[63] Hence, the reduction in anger, anxiety, and depression and improvement in WHQ satisfaction and performance may represent long-term benefits not captured by the KYN disease risk model.

TABLE 5 Changes in Biomarkers of Disease Risk With Integrative Program*

	Baseline			Endpoint			
	Mean	Median	SD	Mean	Median	SD	*P* value†
BMI (kg/m2)	26.8	26.7	5.5	26.5	25.8	25.8	.008
Waist circumference (cm)	91.6	90.0	15.3	90.2	89.5	89.5	.003
Pulse (BPM)	64.8	64.0	9.9	60.7	60.0	60.0	<.001
Systolic BP (mm Hg)	121.0	119.5	13.7	119.8	116.0	116.0	.237
Diastolic BP (mm Hg)	76.8	78.0	7.4	75.6	75.0	75.0	.095
Total cholesterol (mg/dL)	198.8	195.0	40.1	212.4	205.0	205.0	.007
HDL cholesterol (mg/dL)	65.4	66.0	21.0	63.1	64.0	64.0	.109
Glucose (mg/dL)	95.5	91.0	17.1	96.3	95.0	95.0	.300
CRP (mg/L)	2.3	1.4	3.8	2.2	1.2	1.2	.068

*Intention-to-treat sample (n = 63).
†*P* value was calculated by the Wilcoxon Signed Rank Test.
Abbreviations: BMI, body mass index; BPM, beats per minute; BP, blood pressure; HDL, high-density lipoprotein; CRP, C-reactive protein (high sensitivity).

TABLE 6 Changes in Psychosocial Measures With Integrative Program*

	Baseline			Endpoint			
	Mean	Median	SD	Mean	Median	SD	*P* value†
Anger BMS (0-20)	2.6	2.0	2.6	1.9	1.0	2.6	.014
Anxiety BMS (0-20)	3.3	3.0	3.0	2.4	1.0	2.9	.004
Depression BMS (0-20)	2.0	1.0	2.8	1.4	0.0	2.5	.021
Perceived stress PSS (0-16)	3.8	3.0	2.8	4.3	4.0	2.8	.311
Relationship datisfaction RSAT (0-30)	21.7	25.0	8.1	24.4	26.0	6.8	.004
Patient activation PAM (0-100)	68.3	68.0	16.3	76.7	78.0	16.1	<.001
Health satisfaction WHQ (10-100)	68.6	69.0	13.1	75.5	76.0	13.3	<.001

*Intention-to-treat sample (n = 63).
†*P* value was calculated by the Wilcoxon Signed Rank Test.
Abbreviations: BMS, Brief Mood Survey; PSS, Perceived Stress Scale; RSAT, Relationship Satisfaction Test; PAM, Patient Activation Measure; WHQ, Wheel of Health Questionnaire.

Changes Accounting for Reduction in Disease Risk

A significant drop in mean BMI and waist circumference and an increase in aerobic exercise frequency (Tables 5 and 6) explain the decrease in modifiable diabetes risk, as calculated by the KYN disease assessment tool (Table 3). Improvements in BMI and exercise frequency also accounted for the drop in modifiable risk of stroke after the intervention. In contrast, the CHD risk-reducing effects of decreased BMI and increased exercise level were counterbalanced by increases in total cholesterol; these counterbalanced effects explain the lack of improvement in modifiable CHD risk.

The increase in cholesterol observed in the study was interesting since total cholesterol does not increase appreciably with age during the fifth and sixth decades of life.[64] It is not clear which factors contributed to the mean increase in cholesterol; however, a portion of the change can be attributed to three participants whose total cholesterol increased by more than 79 mg/dL each. One of these was diagnosed with cancer and experienced a notable increase in body mass, the second participant increased weight by 1.2 kg (2.6 lbs) and discontinued a lipid lowering medication, and the third participant gained 0.9 kg (2 lbs) but otherwise reported no notable changes.

Resting pulse was not part of the disease risk algorithm; nonetheless, it decreased significantly between baseline and endpoint, probably related to improved exercise level reflecting better fitness and cardiovascular conditioning.

Patient activation at baseline did not predict the variability in disease risk reduction. This result is consistent with the intervention's personalized approach to lifestyle change. The health immersion and follow-up coaching were tailored to the participant's baseline level of motivation and engagement. Clinicians and coaches worked within this context to enhance patient

TABLE 7 Changes in Health Behavior With Integrative Program*

	Baseline			Endpoint			
	Mean	Median	SD	Mean	Median	SD	*P* value†
Stretching frequency (1-4)	1.9	2.0	0.9	2.2	2.0	1.0	.006
Aerobic exercise frequency (1-4)‡	2.3	2.0	1.0	2.6	3.0	0.9	<.001
Strengthening exercise frequency (1-4)	1.8	2.0	0.8	1.9	2.0	0.8	.252
State of Change (RTC): Weight reduction (0-4)	1.8	1.0	1.4	2.4	3.0	1.4	.009
State of Change (RTC): Exercise RTC (0-4)	2.5	3.0	1.3	2.7	3.0	1.3	.122
State of Change (RTC): Healthier eating (0-4)	2.7	3.0	1.2	3.0	3.0	1.0	.008
State of Change (RTC): Stress reduction (0-5)	2.7	3.0	1.8	3.4	4.0	1.7	<.001
State of Change (RTC): Mental focus (0-4)	1.7	1.0	1.3	2.4	3.0	1.4	<.001
Health Performance WHQ (10-100)	67.6	68.5	11.7	74.7	77.0	12.7	<.001

*Intention-to-treat sample (n = 63).
†*P* value was calculated by the Wilcoxon Signed Rank Test.
‡Exercise (>20 min) frequency per week: 1 = fewer than once; 2 = 1-2 times; 3 = 3-4 times; 4 = 5 or more times.
Abbreviations: RTC, readiness to change; WHQ, Wheel of Health Questionnaire.

engagement and accomplish patient-stated goals. These results are encouraging from the standpoint that participants were able to achieve disease risk reduction regardless of baseline level of activation. The increases in PAM seen in the present study can be benchmarked against a previous intervention that also used tailored telephonic coaching as a disease management strategy. Both studies demonstrated significant increases in mean PAM scores; however, the current study showed an increase in score of 8.4 (68.3 at baseline to 76.7 at endpoint) compared to an increase of 4.6 (64.3 at baseline to 68.9 at endpoint) in the benchmark trial.[65]

The moderate utilization of telephonic coaching (50.5% mean utilization of available coaching) is of interest. It contrasts with two of our other studies that used the same approach and even some of the same coaches; in these two RCT studies, telephonic coaching adherence was 74%[26] and 93%.[66] Possible explanations for the utilization differences in the present study include the following: (1) The study intervention offered "optional" IH coaching whereas coaching was much more strongly encouraged in the other two intervention studies; (2) distinct demographics in the present study (ie, older population with fewer women, minorities, and persons of low or moderate socioeconomic status) compared to the previous trials; and (3) according to the treatment team and lead physician, the present sample was composed of "high achievement–oriented individuals, many of whom wanted a personalized health plan and then acted on it independently." Hence, it appears that latent factors such as motivation, personality (eg, Type A), and life experiences (many executives) contributed to the lower level of coaching utilization.

The improvements in disease risk biomarkers seen here are somewhat less extensive then those reported from intensive multimodal lifestyle interventions such as those conducted by Daubenmier et al[23] and Ornish et al.[24] There are, however, substantive differences between the present intervention and previous lifestyle trials. Namely, the current intervention was significantly shorter in duration and intensity. In addition, the current trial was conducted among a sample with lower initial disease risk. Given the rapidly growing cost concerns in health care, it is reasonable to evaluate outcomes in the context of program duration and intensity. Within this context, the results of the current study are notable since they were achieved with a 3-day intervention plus fewer than 4 hours of telephonic follow-up. In contrast, the Lifestyle Heart Trial conducted by Ornish et al[24] employed a 7-day retreat with 4-hour twice-weekly group support meetings lasting for 1 year.

The lifestyle changes in the present study are comparable to those of a previous controlled trial that tested the effects of an integrative intervention with health coaching[26] on cardiovascular

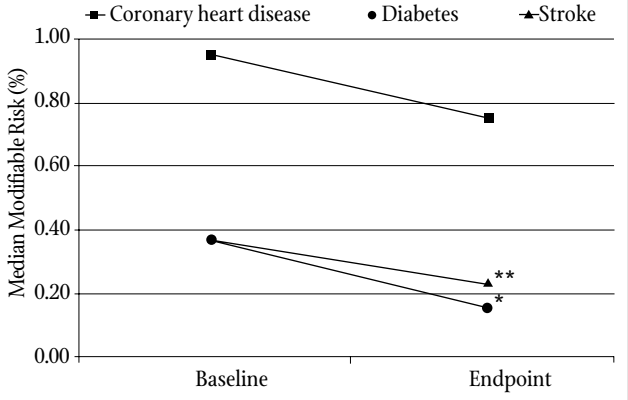

FIGURE 2 Median 5-year Modifiable Disease Risk

The median modiable risk of diabetes decreased (**P*=.02) from 0.37% SD 2.55% to 0.16% SD 2.98%; risk of stroke decreased significantly (***P*<.01) from 0.37% SD 2.09% to 0.23% SD 2.32%; and risk of coronary heart disease declined (nonsignificant; *P*=.17) from 0.95% SD 1.30% to 0.72% SD 1.97%.

risk. The current study was conducted in a healthier population, utilized less coaching, and capitalized on the added benefit of a 3-day health immersion. Both studies, however, demonstrated similar baseline-to-endpoint improvements in readiness to lose weight and increase physical activity, frequency of exercise, and reduction in BMI.

Future study of integrative health models of care would benefit from RCT designs with larger samples. There is also a need to further explore the mechanisms of behavior change and the dose effect of these interventions. Finally, from a cost-effectiveness perspective, it may be useful to clarify which aspects of the program are most effective for which participants.

The principle limitations of this study were low sample diversity, moderate sample size, and the observational study design. The intervention demonstrated effectiveness among a sample of relatively healthy older adults who were predominantly white and reported income and education well above the median. It is yet to be seen if these findings will generalize to other populations. A self-selection bias may have also influenced the results; participants who elected to take part in this study may have had stronger motivation to change health behaviors. However, selection bias is not evident based on initial patient activation scores, which are in fact slightly below the normative mean of 69 observed among employed adults.[40] Also, the observational study design, though appropriate for exploratory purposes, does not account for the influence of expectancy or the natural course of health. Finally, analysis of mean changes in heterogeneous groups presents a challenge since large sample variability can mask important shifts in subsets of individuals. This warrants further study utilizing methods such as structural equation modeling and path analysis to assess individual differences and determine patterns of change.

CONCLUSION

Health behavior changes were accompanied by an improvement in patient activation and psychosocial measures (anger, anxiety, depression, relationship satisfaction) and a decrease in modifiable risk of stroke and diabetes. This suggests that an integrative health model can help patients become more engaged in self-management of health and support them in making and maintaining healthy lifestyle changes.

Acknowledgments

The authors would like to thank Shin-Yiing Yeung, BS; Tracey Hawkins, BA; Lesley Chapman, BS; and Marius Kluenger, BS; for their assistance in data collection; Julie D. Pruitt, MS, RD; Bill Kraus, MD; Connie Bales, PhD; and ActivHealth for the use of their online health education materials; Timothy Smith, PhD; Mark Ruby; Guizhou Hu, MD, PhD; and Biosignia for technical assistance and use of the Know Your Number assessment; Linda Smith, PA, for intervention program oversight; Janna Fikkan, PhD; and Mark Dreusicke, BS; for manuscript editing; the Cliffs Communities for financial and recruitment support; Holbrook Raynal, MD, DHA, and the Preserve Health team for providing facilities and support for endpoint data collection; the Ripple Foundation for infrastructure funding of the Duke Integrative Medicine (IM) research team; and the Duke IM clinicians who supported this program: Sam Moon, MD, MPH; Shelley Wroth, MD; Evangeline Lausier, MD; Louise Goldstein, RN; Jeff Brantley, MD; Beth Reardon, MS, RD; Janet Shaffer, LAc; Jennifer Davis, MA, LPC; Jeanne Van Gemert, MA, LPC; Jessica P. Wakefield, MA, LPC; Julie Kosey, MS, CPCC; Kerry Little, MA, CPCC; JoAnna Stange, BA, CPCC; Faith Seay, RN; Mary Peterson, MA; and Noah St John, MS. This study was funded in part by The Cliffs Communities, Inc, and in part by the Ripple Foundation. The paper was supported by grant K99 AT004945 from the National Institutes of Health (NIH) National Center for Complementary and Alternative Medicine to J. M. Greeson, and its contents are solely the responsibility of the authors and do not necessarily represent the official views of the NIH.

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Menopause-related Symptoms: Traditional Chinese Medicine vs Hormone Therapy

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Objective • To compare the therapeutic effect of Chinese herbal medicine (CHM), acupuncture, and hormone therapy on menopause-related symptoms of peri- and postmenopausal women.
Study design • Fifty-seven Chinese women completed 2 months of treatment with either CHM (5 g twice daily, n = 22), acupuncture plus CHM (Kun Bao Wan) 5 g twice daily plus sessions of acupuncture, n = 20), or hormone therapy (n = 15).
Main outcome measures • Kupperman index score, levels of follicle-stimulating hormone (FSH) and estradiol, and the number of symptoms before and after treatment were the main outcome measures.
Results • CHM, acupuncture plus CHM, and hormone therapy significantly decreased Kupperman score ($P < .001$ in each group) and number of symptoms ($P < .05$). The mean difference in Kupperman score between baseline and 2 months among the three groups was significantly varied ($P = .02$). The difference was only between acupuncture plus CHM and CHM with significantly better results by acupuncture plus CHM. Acupuncture plus CHM, as well as hormone therapy, significantly reduced the level of FSH ($P < .05$), but CHM alone didn't cause any significant decrease in FSH levels ($P > .05$). The mean difference in the level of FSH between baseline and 2 months among the three groups was significantly different ($P = .02$). This difference was only between CHM and hormone therapy with significantly better results by hormone therapy. The three treatments didn't make any significant increase in the level of E2 ($P > .05$).
Conclusion • Application of the combination of Chinese herbal medicine and acupuncture proved as effective as hormone therapy in the treatment of menopause-related symptoms, and it achieved better outcomes than herbal medicine alone. (*Altern Ther Health Med.* 2011;17(4):48-53.)

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Menopause is defined as the permanent cessation of menstrual periods that occurs naturally or that is induced by surgery, chemotherapy, or radiation.[1] Many women go through the menopausal transition and postmenopause with few or no symptoms, whereas others present significant or even disabling symptoms, including vasomotor symptoms (VMS), sleep disturbances, vulvovaginal atrophy, sexual dysfunction, mood disturbances (depression, anxiety, and irritability), and somatic symptoms (back pain, fatigue, and stiff or painful joints).[1-3]

The estimates of the prevalence of VMS vary from 35% to 50% in perimenopause and from 30% to 80% in postmenopausal women.[1] A study on women from seven Southeast Asian countries found fewer VMS in Asian women than Western women, but the prevalence was nevertheless not negligible.[4] Another study on Chinese women living in Sydney aged between 45 and 65 years reported that 34% of them experienced hot flushes and 27% experienced night sweats.[5] Previous studies estimated that 75% of women over 50 years of age experience VMS,[6,7] and 60% of peri- and postmenopausal women seek medical care for their menopausal symptoms.[8] These statistics highlight the immense financial burden of VMS. The impact of VMS has gained increasing importance as the lifespan of women has increased throughout the world. Women can expect to spend a significant portion of their lives after menopause, so maintaining functional ability and a desirable quality of life after menopause is of utmost importance.[7] Hot flushes affect work (46.0%), social activities (44.4%), leisure activities (47.6%), sleep (82.0%), mood (68.6%), concentration (69.0%), sexual activity (40.9%), total energy level (63.3%), and overall quality of life (69.3%) in women with VMS.[9]

The conventional treatment for this condition is hormone therapy (HT), and many women seek HT for the treatment of menopausal symptoms. However, a significant number of women refuse

or discontinue HT because of perceived risks, medical contraindications, or a general reluctance to use unnatural exogenous hormones.[10,11] Concerns about the safety of estrogen-based hormone replacement therapy such as risk of breast cancer, coronary heart disease, and stroke[12,13] have led to demands for other options, and many women are now actively seeking alternative approaches.

Herbal medicine and acupuncture have been used for centuries in China to treat menopausal symptoms and are still popular. Clinical trials in China have manifested significant efficacy of Chinese herbal medicine (CHM) like Kun Bao Wan (KBW) in alleviating menopausal symptoms in Chinese women.[14-18] Also, many clinical trials suggest the positive effects of acupuncture in decreasing menopause-related symptoms.[19-23]

This study was designed to assess the efficacy of KBW, which is a mixture of many Chinese medicinal herbs, in comparison with two other study groups, HT and acupuncture plus CHM, in relieving the menopausal symptoms in Chinese peri- and postmenopausal women. The women met the Chinese medicine diagnosis pattern of kidney and liver yin deficiency accompanied by liver yang hyperactivity as a determining inclusion criterion.

METHODS

Participants

This clinical trial was carried out during a 14-month period between June 2008 and July 2009 at Dongzhimen Hospital, which is affiliated with the Beijing University of Chinese Medicine and Peking University People Hospital. Ninety-seven Chinese women who were referred to the clinic of gynecology for their menopause-related symptoms were screened for inclusion and exclusion criteria. Peri- or postmenopausal women who showed at least three of the 11 Kupperman Index symptoms—hot flushes, paresthesia (the feeling of "pins and needles" on one's skin), insomnia, nervousness, melancholia, vertigo, weakness, arthralgia or myalgia, headache, palpitations, and formication (the sensation of insects crawling on or under one's skin)—were entered into the study provided that they were at least 40 years old. Perimenopausal women were included if they exhibited menstrual irregularities or a rise in the level of follicle-stimulating hormone (FSH) greater than 10 IU/L. The inclusion criterion for Chinese medicine diagnosis was the pattern of kidney and liver yin deficiency accompanied by liver yang hyperactivity. A "red tongue without fur" was present in all patients. The Chinese medicine syndrome differentiation was established by only one Chinese medicine doctor in order to ensure uniform diagnosis. Those taking medications that influenced the rate of hot flush (systemic HT, selective serotonin reuptake inhibitors) were included only after a washout period of 8 weeks (4 weeks for those taking local estradiol [E2] preparations). Gynecological examination and laboratory tests were carried out to screen the patients for any organic diseases of the reproductive system. Patients were asked whether they were currently under medical treatment or suffering from breast cancer or serious cardiac, renal, metabolic, endocrine, or hepatic disease. After the application of inclusion and exclusion criteria, 25 women were excluded and 72 were entered into the study and randomized into three groups. Of the included patients, 57 chose to continue during the course of treatment, but 15 patients dropped out. Participants were randomized into three equal groups using a randomization chart. Randomization assignments were placed in a table visible to be assigned sequentially. Among 57 patients who remained in the study to the end, 22 were in the CHM group, 20 were in the acupuncture plus CHM (ACU + CHM) group, and 15 were in the HT group (Figure). Blinding women to their treatment assignment was impossible in this study. The study period consisted of 2 consecutive months. We attempted to measure the participants' compliance with assigned study treatment by calling them regularly. The study was thoroughly conducted in line with the Declaration of Helsinki. The aim and methodology of the study were explained to the patients, and informed consent was obtained. Blinded study personnel asked the patients about their symptoms.

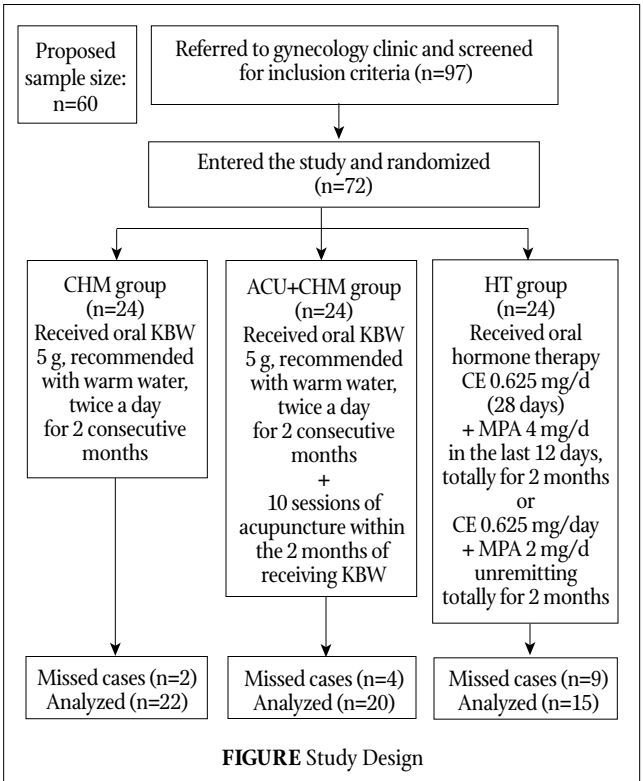

FIGURE Study Design

Abbreviations: CHM, Chinese herbal medicine; KBW, Kun Bao Wan; ACU, acupuncture; HT, hormone therapy; CE, conjugated estrogen; MPA, medroxyprogesterone acetate.

Administration

The ingredients of KBW are as follows: *Fructus Ligustri Lucidi* 4.13%; *Radix Paeoniae Lactiflorae* (wild-crafted form) 4.13%; *Radix Paeoniae Lactiflorae* (cultivated form) 8.25%; *Radix Rehmanniae* 4.13%; *Fructus Rubi* 2.75%; *Radix Angelicae sinensis* 2.75%; *Semen Cuscutae Chinensis* 2.75%; *Radix et Caulis Jixueteng* 8.25%; *Lycii Fructus* 2.75%; *Semen Zizyphi Spinosae* 1.38%; *Radix Scutellariae Baicalensis* 4.13%; *Flos Chrysanthemi Morifolii* 4.13%; *Herba Ecliptae* 5.5%; *Radix Adenophonrae* 4.13%; *Folium Mori Albae* 2.75%; *Radix Cynanchi Baiwei* 4.13%; *Anemarrhena Rhizome* 4.13%; *Radix Polygoni Multiflori* 2.75%; *Herba Dendrobii* 4.13%; *Lycii Cortex* 4.13%; *Colla Plastrum Testudinis* 2.06%;

Tuber Ophiopogonis Japonici 2.75%; *Concha Margaritifera* 8.25%; and honey 5.76%. This CHM had been produced by Beijing Tong Ren Tang Company as brown honey-pills with a sweet, mildly bitter taste. All herbs were administered within standard dosage levels and were screened for heavy metals. The dosage of the formula was based on the *Pharmacopoeia of the People's Republic of China 2005*[23] and previous animal experiments. Each dose of CHM was packaged in identical foil sachets. Patients in the CHM group were instructed to ingest one sachet of KBW pills with warm water twice a day after a meal.

Patients in the ACU+CHM group received 10 sessions of acupuncture using kidney tonifying protocol as well as 5 g (one sachet) of KBW twice a day. In every session of acupuncture therapy, needles were retained for 20 minutes without any additional manipulation, moxibustion, or cupping. The same acupoints were used in all patients, including UB23, UB15, KD3, SP6, LV3, LU7, KD6, CV4, HT6, KD7, and LI4. Those acupoints were selected according to traditional indication for the treatment of the pattern of kidney and liver yin deficiency accompanied by liver yang hyperactivity, which was the chosen Chinese medicine pattern as an inclusion criterion in this research.

The HT group was offered two different regimens during the 2-month study period depending on the patient's willingness for menses: steady conjugated estrogen 0.625 mg per day plus medroxyprogesterone acetate 2 mg per day or conjugated estrogen 0.625 mg per day for 28 days plus medroxy progestrone acetate 4 mg per day in the last 12 days repeated after 7 days of rest.

Detection Index and Method

The favorable sample size was estimated at 60 participants based on the results of previous studies[21,23] with the level of confidence at 95% and power at 80%. The actual sample size was increased by 20% compared to the proposed sample size (n=72) in anticipation of probable dropouts. The clinical menopausal symptoms were assessed employing the Kupperman index scale. The primary outcome was the mean difference in Kupperman score between baseline and 2 months. The secondary outcome measures were the mean difference in FSH, E2, and number of symptoms between baseline and 2 months. The method for measuring the level of FSH and E2 was chemiluminesence immunoassay. All reagents were provided by Siemens Health Care Diagnostics Ltd, Shanghai, China. In perimenopausal women with variable cycles, the levels of FSH and E2 were drawn on the third cycle day.

The Kupperman Index was used to assess the symptoms. The Kupperman Index and the modified Kupperman Index have been adopted by most of the researchers on menopausal symptoms in China. According to the study by Xu et al,[24] the modified Kupperman Index is the most appropriate to use in research on the effects of Chinese medicine on menopausal symptoms because it perfectly corresponds to the detailed symptoms derived from the theory of Chinese medicine. The Kupperman Index used in this study was very similar to the modified version, except it assesses one more symptom, paresthesia.

Data Analysis

Results were analyzed with the Statistical Package for Social Sciences (SPSS 11.5 for Windows; SPSS Inc, Chicago, Illinois) by an independent university statistician who was blind to the study groups. A Kolmogorov-Smirnov test demonstrated that Kupperman index, FSH, E2, number of symptoms before and after the treatment, and differences were normal in all three groups. Therefore, *t*-test and analysis of variance (ANOVA) were found valid. Data were analyzed with ANOVA, paired and independent sample *t*-test, chi-square test, and Tukey's Honestly Significant Difference (HSD) test. Significance level stood at .05.

RESULTS

The participants were between 40 and 59 years of age with an average age of 48.87±3.71 years. There was no significant difference in the background characteristics of patients among the three groups (Table 1).

Comparison of Kupperman Score Among Groups

All three groups showed a significant reduction in symptoms from the pretreatment to posttreatment stage according to paired *t*-test results ($P<.001$; Table 2). Mean and standard devia-

TABLE 1 Participants' Background Characteristics

Item	KBW (n=22)	ACU+KBW (n=20)	HT (n=15)	Significance
Demographic Characteristics				
Age	49.36±4.07	49.65±2.97	47.13±3.70	$P=.09$ (ANOVA one-way test)
Married	21	20	15	$P=.46$ (chi-square test)
Single	1	0	0	
Educational Background				
High school diploma and less	4	3	1	$P=.60$ (chi-square test)
College and more	18	17	14	
Stage of Menopause				
Perimenopause	16	13	11	$P=.82$ (chi-square test)
Postmenopause	6	7	4	

Abbreviations: KBW, Kun Bao Wan; ACU, acupuncture; HT, hormone therapy.

TABLE 2 Comparison of Study Outcomes in Treatment Groups*

	KBW Group (n=22)			ACU+KBW Group (n=20)			HT Group (n=15)		
Item	Pre-treatment	Post-treatment	Mean difference	Pre-treatment	Post-treatment	Mean difference	Pre-treatment	Post-treatment	Mean difference
Kupperman score	19.68±7.41	11.09±5.23‡	8.59	25.80±9.63	11.25±7.36‡	14.55	18.73±8.12	7.6±6.04‡	11.13
FSH (IU/L)	55.93±28.95	47.08±38.22§	8.84	55.48±27.58	41.29±25.81†	14.18	80.78±34.55	48.37±30.65†	33.40
E2 (Pg/mL)	49.23±58.92	76.13±82.54§	26.9	55.58±62.88	76.01±84.09§	20.42	14.72±25.39	42.55±49.77§	27.83
Number of symptoms	7.40±2.15	5.54±2.64†	1.86	8.95±2.39	5.55±2.96†	3.40	6.46±1.64	3.80±2.21†	2.66

Abbreviations: KBW, Kun Bao Wan; ACU, acupuncture; HT, hormone therapy; FSH, follicle stimulating hormone; E2, estradiol.
*Values are given as mean ± SD.
†$P < .05$, compared with pretreatment in the same group.
‡$P < .001$, compared with pretreatment in the same group.
§Not significant, compared with pretreatment in the same group.

tion of decrease in Kupperman score was 8.59±6.005 in CHM, 14.55±8.46 in ACU+CHM, and 11.13±5.80 in the HT group. The mean difference in Kupperman score was compared between baseline and after 2 months among the three groups using one-way ANOVA tests, which revealed that the effect of the three treatments on Kupperman score was different ($P = .02$). Tukey's HSD test showed that the only difference was between the ACU+CHM group and the CHM group (Table 3), meaning that ACU+CHM decreased the patients' Kupperman score significantly more than did CHM alone. There was no significant difference between HT and the two other treatments.

Comparison of Serum Levels of Follicle-stimulating Hormone and Estradiol Among Groups

After treatment, the level of FSH decreased in the ACU+CHM group and the HT group significantly ($P < .05$; Table 2), but CHM alone didn't result in any significant decrease in the level of FSH ($P > .05$). The level of E2 did not indicate any significant increase in any group ($P > .05$; Table 2).

The mean difference in FSH levels was compared between baseline and after 2 months among the three groups. According to a one-way ANOVA, the effect of three treatments on the level of FSH was different ($P = .021$). Tukey's HSD test showed that this difference was only between CHM group and HT group with significantly better results for HT. There was no significant difference between either the ACU+CHM and HT groups or between ACU+CHM and CHM groups in decreasing the level of FSH (Table 3). The mean difference in the level of E2 between baseline and after 2 months among the three groups was not significantly different ($P = .96$).

TABLE 3 Comparison of Kupperman Score and FSH Between 3 Treatment Groups*

Group	Kupperman Score	FSH
KBW and ACU+KBW	.02	.80
KBW and HT	.46	.02
ACU+KBW and HT	.40	.075

*Amounts are *P* values obtained from Tukey HSD test.
Abbreviations: FSH, follicle stimulating hormones; KBW, Kun Bao Wan; ACU, acupuncture; HT, hormone therapy.

Comparison of Number of Symptoms Among Groups

All three groups showed a significant reduction in the number of symptoms from the pretreatment to the posttreatment stage, according to paired *t*-test ($P < .05$ in CHM group and $P < .001$ in ACU+CHM and HT groups; Table 2). The mean difference in the number of symptoms was compared between baseline and after 2 months among the three groups using one-way ANOVA, which yielded no significant difference ($P > .05$).

Adverse Results

None of the patients developed any adverse reaction during the 2 months of treatment.

DISCUSSION

Concerns about the safety of hormone therapies have led to demand for alternative options by women experiencing menopause-related symptoms. Among alternative therapies, acupuncture and CHM are vastly popular with middle-aged women in China and around the world. Many clinical trials have found acupuncture effective in the treatment of menopause-related symptoms. However, those studies with sham acupuncture as a control did not find any superiority for acupuncture over sham acupuncture. The findings of this study confirm the results of those studies that found acupuncture effective in the treatment of menopause-related symptoms. Among them, two similar studies by Xia[19] and Qin[20] observed that electroacupuncture significantly decreased the Kupperman score, achieving relatively the same success as the hormone therapy. Likewise, it decreased the level of FSH and increased the level of E2. Although this study confirms the decrease in Kupperman score and FSH due to acupuncture, it does not confirm their findings concerning E2 level. Another study by Jin et al[21] examined the effect of acupuncture at the five-zangshu points vs Premarin (conjugated estrogens), which found a considerable decrease in Kupperman score and increase in E2 for both treatments, with significantly better results from acupuncture. The current study corroborates their

study in the decrease in Kupperman score by acupuncture and HT but does not confirm it with regard to E2. Furthermore, no significant difference between HT group and acupuncture group was identified. A study by Tian and Zhang showed better results for a combination of herbs and acupuncture (97%) vs HT (73%), which does not coincide with the results of this study indicating the same efficacy for both of these groups.[22]

In Chinese medicine, menopausal problems are fundamentally due to a decline of kidney essence, which can take the form of kidney yin, kidney yang, or a combined deficiency of kidney yin and kidney yang. In this study, only patients with a syndrome of decline in the yin of kidney and liver accompanied by hyperactivity and rising of liver yang were admitted as participants. This syndrome is characterized by red tongue without fur. According to traditional principles of treatment, these patients needed to receive herbs to nourish their yin of kidney and liver, subdue the yang of liver, and calm the mind, so the formulation of KBW was chosen. KBW has been formulated on the basis of the classic theories of traditional Chinese medicine and previous animal experiments. In the formula of KBW, *Fructus Ligustri Lucidi*, *Radix Paeoniae Lactiflorae*, and *Radix Rehmanniae* were chosen as the monarch drugs, meant to nourish the yin of liver and kidney.[26-28] *Flos Chrysanthemi Morifolii* and *Radix Scutellariae Baicalensis* help to subdue liver yang. *Semen Zizyphi Spinosae* subdues the yang of liver and calms the mind.[26-28] New research about the primary herbs shows their various benefits for women in peri- and postmenopause. Many recent studies suggest that *Fructus Ligustri Lucidi*[29-33] and *Radix Paeoniae Lactiflorae*[34] are useful as an alternative medicine for improving calcium balance and preventing osteoporosis in postmenopausal women, which is in accordance with the traditional Chinese medicine theory on nourishing the kidney yin. The extract of *Fructus Ligustri Lucidi* improves calcium balance, modulates the calciotropic hormone level, and increases vitamin D–dependent calcium transport in aged ovariectomized rats.[30] Whereas *Fructus Ligustri Lucidi* did not show estrogenic effects in the research by Zhao et al,[35] *Radix Rehmanniae* is reported to have certain phytoestrogenic effects in one study.[36] More investigations are necessary to clarify these effects.

This study found a significant decrease in clinical symptoms as reflected in the decrease of total Kupperman scoring and number of symptoms in all three therapies with no significant difference between HT and the other two traditional treatments, suggesting that herbal treatment and acupuncture may offer as much benefit as the conventional treatment (HT) without posing the risks that HT does. However, the group treated with acupuncture in conjunction with herbal medicine presented significantly better results than those receiving herbal medicine alone in controlling symptoms. Herbal treatment alone failed to decrease the level of FSH. This may suggest that the underlying mechanism of this formulation of medicinal herbs should not be estrogenic effects, a supposition that diminishes concerns about the risk of the phytoestrogenic properties of these herbs. Of course, this matter deserves more rigorous investigation. On the other hand, the decline in FSH resulting from the ACU+CHM treatment suggests a real physiologic effect in this group. One hypothesis states that the effectiveness of acupuncture in relieving menopausal symptoms may be due to the triggering of the release of hypothalamic ß-endorphin; another hypothesis points to the release of 5-HTP. A decrease in the activity of hypothalamic ß-endorphin and a decrease in the level of blood serotonin are considered two presumed pathways in the pathophysiology of menopausal vasomotor symptoms. Hypotheses concerning the acupuncture mechanism in alleviating menopausal symptoms need to be explored by future studies. Also, further studies with more control groups are recommended in order to better clarify and compare the effects of herbal medicine and acupuncture (eg, a clinical trial with acupuncture, sham acupuncture, herbal medicine, and HT groups).

CONCLUSIONS

This study reveals that the application of a combination of CHM and acupuncture is as effective as HT in the treatment of menopause-related symptoms and that it works better than herbal medicine alone. Chinese herbs together with acupuncture may be a useful alternative treatment for women suffering from menopausal symptoms and who are unable or reluctant to receive HT.

Acknowledgments

Authors of this article thank Yunzhi Chen, PhD, Xiaoyan Dou, MSc, Lu Liu, MSc, Muhammad Ali Rasaee, and Amir Hossein Sabouri, MD, for their sincere help, as well as the patients who contributed in the research. Hoda Azizi is thankful to Iran's Ministry of Health and Medical Education for its support by presenting a scholarship to her for doctoral work at the Beijing University of Chinese Medicine. She is also grateful to Beijing University of Chinese Medicine for supporting her doctoral thesis (grant 2001201051550-10).

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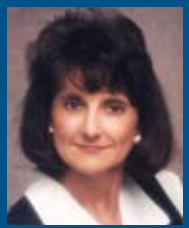

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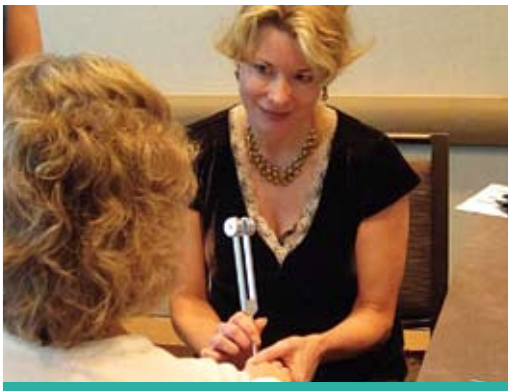

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CASE REPORT

Eurythmy Therapy in Anxiety

Jane Hampton Schwab; John Bernard Murphy; Peter Andersson, MD; Gunvor Lunde, MD; Helmut Kiene, MD; Harald Johan Hamre, MD; Gunver Sophia Kienle, MD

Anxiety is a highly frequent condition; many patients seek complementary treatment. One of these is anthroposophic medicine (AM) using therapeutic approaches that are based on a distinct concept of the human organism, illness, and healing. AM is applied in anxiety; however, little is known about underlying therapeutic concepts, the effectiveness, and the modalities of clinical reasoning and judgment.

Presented is a 21-year-old woman who had suffered from severe and increasing anxiety for 6 months, which had led to social isolation and complete sick leave from work. She had attended an AM health care center and counseling at a psychiatric hospital but had not improved significantly after 6 months. Eurythmy therapy (EYT) was then applied for 8 weeks. Within the AM pathophysiological context, the patient was diagnosed as having stress-induced anxiety based on a juvenile disturbance of the rhythmical system. Associated symptoms were specific anomalies in the patient's eurythmy movement pattern, a "breathed-in-upwards syndrome." In the EYT sessions, clear interconnections between EYT-exercises and symptom-relief were observable, paralleled by a substantial relief of the patient's anxiety.

EYT might have some impact on anxiety syndrome and should be investigated in more detail. (*Altern Ther Health Med.* 2011;17(4):58-65.)

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Anxiety disorders are increasingly recognized as a major health concern, often underdiagnosed and undertreated, and with substantial disability, reduced quality of life, reduced work capacity, and increased health care use.[1-6] About 6% to 19% of adults in the West are affected every year, and about 10% to 29% are affected during their lifetimes.[7,8] Subtypes of anxiety disorders include generalized anxiety disorder, panic disorder, specific phobias, obsessive-compulsive disorder, social anxiety disorder, and posttraumatic stress disorder.[9] Generalized anxiety disorder is characterized by persistent, excessive, and unrealistic worry about everyday things. It is accompanied by various symptoms: of autonomic arousal (eg, palpitations, sweating, trembling), in the chest and abdomen (eg, difficulty breathing, chest pain, nausea, diarrhea), of mental state (eg, dizziness, feelings of unreality, fear of dying, difficulty in concentrating), and general symptoms (eg, muscle tension, numbness or tingling, aches and pains, hot flushes or cold chills, restlessness, fatigue) and sleep disturbance.[10] Treatment options are medication (selective serotonin reuptake inhibitors, tricyclic antidepressants, benzodiazepines, and others) and psychotherapy, especially cognitive behavioral therapy, relaxation therapy, and self-help approaches.[10,11] However, not all patients benefit from these treatment options. Even under the optimal conditions of a clinical trial, 20% to 60% of the patients do not improve. Furthermore, anxiety disorders have a relapsing course, and medication alone rarely leads to complete recovery.[10,12-16]

About half of the patients with anxiety use complementary and alternative medicine (CAM).[17,18] One CAM system is anthroposophic medicine (AM), founded by Rudolf Steiner and Ita Wegman in the early 20th century.[19,20] It is based on a specific understanding of the human organism, with particular concepts of pathophysiology and therapeutic intervention. AM is presently practiced as integrative medicine (integrated with conventional medicine) in most European countries, the Americas, some African and Asian countries, Australia, and New Zealand. AM is offered in hospitals (currently 28 specialized AM hospitals), outpatient clinics, and practices. It is provided by physicians, nurses, and therapists. Specific AM treatments include medication, movement (eurythmy therapy [EYT]), rhythmical massage, anthroposophic art therapy (music, painting, poetry, sculpture), and specific counseling that relates to nutrition, lifestyle, coping strategies, biographic-existential aspects, and social aspects of illness. In addition, there are special AM nursing techniques.[20] Treatment of mental disorders is a focus of AM health care,[21] especially in primary care but also in specialized departments or psychiatric hospitals. A prospective cohort study in 2009 assessed outcome of patients treated for anxiety disorders in outpatient settings by AM, including EYT, art, and massage therapies, consultations by AM doctors, and special AM medication. A long-term improvement of anxiety was observed

over 2 years.[22] Two previous studies found beneficial effects of AM therapies on anxiety in cancer patients. [23,24]

Here we present the case of a patient suffering from unspecified anxiety that was treated with an AM treatment—EYT—and showed a remarkable improvement. Clinical observations, AM diagnosis, and treatment are described in the text, and the theoretical background is outlined in the sidebar on page 63..

CASE PRESENTATION

History, Presenting Condition, and Diagnosis

A 21-year-old Swedish woman had collapsed after a busy and stressful working period in summer 2003. She then suffered from increasing episodes of heart palpitations and fainting; increasing symptoms of dizziness and feelings of being disconnected; unrest; fear of being alone, of having cancer, of death; social anxiety; difficulty in making decisions; headache; sleeplessness; tingling in the fingertips, soles of the feet, and left side of the face; nausea; bruxism; and muscular pains, especially in the neck. Often she woke up at night because of anxiety. Symptoms had led to the consultation of an emergency hospital department, but no organic cause (eg, heart trouble, hypo- or hypertension, infection) was found.

From August 2003 onward, the young woman consulted the Family Physician Care Centre of the Swedish AM Vidarkliniken for her anxiety. Here, three physicians (one pediatrician and two general practitioners, one of whom had been the patient's family physician for many years [PA]) saw the patient and made the same diagnosis: stress-induced unspecific anxiety (in detail: unspecified anxiety [International Classification of Diseases (ICD) code F41.9], reaction to stress [ICD code F43.9], and cervical myalgia [ICD code M79]). Important in her medical history was both a traumatic exposure to emotionally stressful family relationships when she was aged 9 to 11 years and the painful experience of the protracted life-threatening illness of her mother when the patient was aged 11 to 13 years. Between ages 16 and 19, the patient had moderately severe anorexia. In addition, she had suffered from several manifestations of anxiety in her childhood, such as obsessive cleanliness, anxiety about contamination, and fear of infection with intestinal parasites. Otherwise, there were no major illnesses or events. Physical, neurological, and laboratory findings were normal except for myalgia in the upper back and neck region.

From Vidarkliniken, the patient was given immediate sick leave from work, first 100% and 3 weeks later 50%. She received outpatient treatment with AM back embrocation and medicine (20 drops *T Cardiodoron* 3 times daily; *Aurum* D10/*Stibium* D8 twice daily; 15 drops *Arnica* D3 3 times daily) and received some instructions for self-help behavioral approaches. Despite the treatment, her condition further deteriorated during the following 2 months. Her anxiety increased so that she was unable to be with others or to leave her home. Her sick leave was increased again to 100%, and her AM medication was changed (20 drops *Bryophyllum Argento* culta 1% 3 times daily and subcutaneous injections *Argentum* D6 + *Conchae* D7 3 times weekly). Additionally from October 2003 onward, she received counseling of a supportive and confirmative nature at a nearby psychiatric outpatient hospital for young people. However, her condition improved little. The patient was dejected by the slow development and her inability to actively contribute to the treatment. The physician (PA) anticipated that about 2 years of treatment were needed in order to achieve a substantial improvement.

Anthroposophic Medicine Diagnosis

Against the background of the anthroposophic concept (see the sidebar), the psychological trauma in the patient's second 7-year age period were seen as to have impacted on two closely connected aspects of the human maturation: the emotional life with special regard to inwardness and the rhythmic system. Disturbances in this specific maturation process can lead to mental/emotional symptoms: that is to say, depression or anxiety. Therefore, the patient's anxiety was interpreted as an after-effect of her traumatic juvenile experiences. Accordingly, the AM specific diagnosis was stress-induced anxiety based on a juvenile rhythmic system disturbance.

In view of this diagnosis, the physician decided on a eurythmy treatment.

Anthroposophic Medicine Treatment: Eurythmy Therapy

EYT (*eurythmy* from the Greek meaning "harmonious rhythm") is a movement therapy involving cognitive, emotional, and volitional elements. It is provided by EYT therapists with 5 years of training according to an international standardized curriculum.[25] EYT is conducted mainly in individual sessions during which patients are instructed to perform specific movements with the arms, the legs, or the whole body. These movements are related to the sounds of vowels and consonants, to music intervals, or to soul gestures (eg, sympathy-antipathy) and are named accordingly. They are selected depending on the patient's disease, constitution, and current pattern of postures, gestures, and movements as far as these express the patient's vitality and spirit-soul levels.[26,27]

In our patient, EYT was indicated in order to (1) treat the patient's rhythmic system and thereby consolidate her both physically and emotionally and (2) strengthen her personality so that she could meet the demands of impending adulthood.

EYT was started at the Vidarkliniken Day Rehabilitation in January 2004, 6 months after the initial consultation for anxiety. EYT was conducted for 8 weeks, one session per week lasting 30 minutes; between sessions, the patient practiced the exercises on her own. Before the EYT sessions, the patient received an AM-specific massage including kidney embrocation using copper ointment, after which she rested in a private room.

After each session, the EYT therapist (JS) documented her observations, treatment decisions, and therapeutic intentions.

Concomitant Therapies

October 2003 to February 2004: 20 drops *Bryophyllum Argento* culta 1% three times daily; subcutaneous injections *Argentum* D6 + *Conchae* D7 three times per week;

October 2003: Supportive counseling once a week until May 2004: thereafter, once a month until November 2004;

January 2004 to March 2004: AM-specific massage including kidney embrocation using copper ointment;

February 2004 to May 2004: dil *Bryophyllum Argento* culta 1%,

20 drops, three times daily; dil *Hypericum Auro* culta 1%, 20 drops twice daily.

EURYTHMY THERAPY OBSERVATIONS, EXERCISES, AND FOLLOW-UP

The patient was asked to perform exploratory EYT exercises, and the therapist's initial observations were as follows: The stream of movement appeared as fastened around head and shoulders, with drawn-up shoulders, stiffness in back, neck and breast region, and with pale complexion. The limb movements were tense, generally dexterous but over-formed and stretched out in the periphery; fingers were tensely pressed together; foot movements were hasty, overexerted, jerky, and carried out with too much pressure; footsteps were short. Breathing appeared shallow. In contrast to healthy people, there was very little ability to flow in her movement and to undulate elastically between polar eurythmic movement qualities such as fast and slow, tensed and relaxed, upward and downward, light and heavy, center-oriented and periphery-oriented, gymnastically dexterous and emotionally expressive. The pattern of observed movement anomalies was discerned as a "breathed-in-upwards syndrome" (Sidebar) and was conceived as an integrated body-functional expression of both a state of anxiety and a rhythmic system disturbance. Accordingly, this EYT-specific diagnosis matched the interpretation of the physician.

To treat the syndrome, specific exercises were selected. For their descriptions, therapeutic goals, and schedule of introduction, see the Table. A 20-minute video presentation of the exercises can be seen at http://www.ifaemm.de/F5a_publi.htm. Several of these exercises (Foot E, IAÅ+Spatial form, B+deep knee bends, Rhythm Yes-No, R, Low pendulum M) were specifically chosen because of their antagonistic relation to the breathed-in-upwards syndrome; the syndrome itself would specifically impede correct conduct of just these very exercises in all their eurythmic complexity. Conversely, it was expected that continuous endeavor to correctly conduct these exercises would clear away the specific impediments and hereby allow rebalance of the organism's three-fold constitution (see the sidebar), thus achieving recovery. Other exercises were introduced in order to warm up the periphery of the body (Love E) or to relax tension. For details, see the Table.

Follow-up

The patient came to the first therapy sessions in a serious and tense mood and conducted the movements gymnastically, effective though overalert. Towards the end of the treatment period, her mood became happier; she was then able to express herself emotionally in the EYT sessions and did so in joy and lightness. The patient showed an interest and natural ability for movement in general, which helped her to quickly connect herself with each exercise in physical, emotional, and personal respect.

During the 8-week treatment period, the anxiety symptoms of the patient substantially improved according to her own as well as her physician's and her counselor's accounts and according to the therapist's observations. After half the period (4 weeks), the patient had fewer anxiety and bodily symptoms, felt physically stronger, and was able to take up part-time employment and become socially active again.

The improvement of the anxiety syndrome was parallel to changes in those specific movement patterns that had been regarded as causally related to the anxiety syndrome (see section about anthroposophic medicine diagnosis and the sidebar) and were specifically aimed at by the EYT exercises. These observations are described below (For exercise descriptions, see the Table.)

First Session

Exploratory exercises: Provisional EYT exercises were introduced to acquaint the patient with EYT, to enable EYT-specific observations, and to select exercises (Table).

Second Session (After 1 Week)

IAÅ + spatial form (to regulate the patient's focus on how her intentions come to expression): In the first session, this exercise had demonstrated upward tension in the breast region, stiff fingers, and overformed gestures in the periphery; the whole exercise had been performed too quickly and was outward orientated. Now, when moving backwards in the context of this exercise, the patient showed the first signs of "coming to herself"; the steps had also become somewhat more peaceful and slower.

B + deep knee bends (to loosen tension around the head, ground the patient): During the first session, the back had been stiff and straight. Now the patient achieved a soft bending in her back, which had an immediate therapeutic effect: She relaxed somewhat in her neck and shoulders and connected more with her feet (ie, she became grounded).

Third Session (1 Week Later)

The R exercise was introduced (to relax the breast and back region and so work through the rhythmical system).

Fourth Session (1 Week Later)

The patient had been bedridden with a cold and was unable to practice more than once. She arrived at the session with menstrual pain and a headache.

R exercise: Previously, the patient had been able to manage this exercise only with a straight back. In the present session, she could roll more flexibly through the breast region, which was associated with an immediate effect: She became warm, breathed more freely, and her cheeks became rosy.

B+deep knee bends: This movement became, unlike in the previous sessions, inwardly expressive. Again, there was the relaxing and grounding effect as in previous sessions but somewhat stronger.

IAÅ + spatial form: Moving backwards was conducted with peaceful steps and an inwardly expressive *A* gesture; the *Å* gesture still remained stiffly held.

Low pendulum M: (to relax muscle tonus, strengthen "breathing-out-downwards"): After introduction, an immediate relaxation in the breast region and "breathing out" could be observed.

Fifth Session (1 Week Later)

The patient had begun work again at 50%. In addition to the

TABLE Applied Eurythmy Therapy Exercises (The exercises can be seen on a 20-minute video at http://www.ifaemm.de/F5a_publi.htm.)

Exercise	Brief Description of Exercise	Therapeutic Goal
Introduced in 1st (exploratory) session		
Love E	Slowly and softly stretch the arms horizontally right and left wide into the periphery, expressing the feeling of love. Then cross the arms quickly and strongly in front of the breast. Repeat 10 times	To warm up from the body center towards the periphery
Foot exercise E	Cross the feet firmly while standing still. Take a step forward and cross again. Repeat several times going forwards then backwards	To release cramp tendency and help "ground" the patient
IAÅ+ spatial form	I=one arm stretches forward upwards, the other stretches backward downwards while walking forward; A=the arms stretch upwards in an angle; this gesture is lowered while walking backwards; Å=the arms form a circle in front while walking in a circle	To regulate the intensity of the patients focus: how she does things, how her intention comes to expression
B+deep knee bends	An embracing, protective gesture with the arms while slowly sinking with deep knee bends to the floor	To loosen tension around the head and ground the patient
Introduced in 2nd session		
Walk rhythm v v - -	Walk rhythmically: short, short, long, long: ie, two short and two long steps forwards; repeat backwards	To bring rhythm into the movement and generally loosen tension
Foot exercise Yes/No	Standing with the feet together, swing the left foot in a half-circle forwards and place it firmly in front=Yes! Repeat 10 times while increasing tempo. Similarly use the right foot backwards=No! Repeat 10 times while increasing tempo. Finally "Yes/No" alternating 10 times while increasing tempo	To deepen the breathing
Introduced in 3rd session (Discontinued from here onward: Love E and Walk rhythm v v—ie, short, short, long, long)		
Rhythm v v - yes, v v - no	Beginning with the right foot, walk forwards with rhythm "short, short, long," then make a strong yes foot gesture (as in Yes/No) above. Repeat backwards beginning with left foot+no foot gesture. 10 times	To bring rhythm into the movement and lengthen the breathing out
R	Arms hands and upper body roll a large, vertical wheeling movement forwards under shoulder height, accompanied by knee bending and stretching	To relax the breast and back region and so work through the rhythmical system
Introduced in 4th session		
Low pendulum M	Walk forwards and rock backwards as if against resistance, the arms, legs, and body meeting this resistance sympathetically	To relax muscle tonus and strengthen the breathing out downward
Introduced in 5th session		
IEE + - v v + spatial form	I as above in IAÅ; E=the arms are crossed energetically; the second E gesture is crossed the other way around—the whole time moving in the room with abrupt changes in direction—one step for each syllable of a poem in dactyl rhythm, ie, one long and two short steps; the gestures coordinate exactly with the steps and the rhythm of the poem	To strengthen self-confidence by mastering this inspiring coordination challenge
Introduced in 7th session		
Head-shaking M	Sitting; shake the head many times sideways while moving alternately the right and left arm in breast height quietly forwards and backwards as if against resistance	To relax and quiet the lower body by "sending the head on holiday"
Great I exercise	Speak the sound I. The I gesture, as above in IAÅ, is repeated many times raying out from the center in all directions; similarly the legs and feet are stretched, then all the arm gestures are repeated: finally "listen" to the body's reaction	To encourage self-expression
8th (final) session		
	Entire program was overviewed and patient recommended to continue 2 wk more at home practicing only: Low pendulum M exercise, the Head-shaking M exercise, and the Great I exercise	

The patient is Swedish; therefore, the exercises were presented in accordance with Swedish pronunciation. The corresponding English pronunciation is I = EE (meet), A = AH (father), Å = OH (doe), E = (hay).

exercises already practiced, she asked for specific exercises to increase her self-confidence. Rhythmically alternating IEE with spatial form was begun.

Sixth Session (1 Week Later)

R exercise: The flexibility that she had achieved in her breast region already in the previous sessions was now extended to the neck and lower back.

IAÅ + spatial form: The exercise became relaxed also in her breast region. Now she could slowly form the *Å* gesture out of a creative intention while moving in a circle; the exercise was expressively created instead of only dexterously managed.

Low pendulum M: Unlike before, the patient was now able to bend forward, integrating her head into the bending. An immediate relaxation in her head and shoulders could be observed, as well as deeply exhaling with an audible sigh.

Seventh Session (1 Week Later)

The patient reported that she felt better; she had more strength and self-confidence, she had been able to go on a ski holiday with friends, and her headaches were less frequent.

Great-I-exercise was introduced (to encourage self-expression).

Eighth Session (1 Week Later; After 8 Weeks Altogether)

R exercise: The patient was able to integrate the entire body elastically in the rhythmical rolling.

IEE exercise: Executing this exercise, there was sovereignty, increased expressiveness in the gestures, increased joy from being able to find a personal expression in the movements, and increased identification with the content of the accompanying poem in concentration, reflection, and insight.

Great I exercise: There was immediate lightness and happiness.

The achieved changes in the patient's movement patterns were continuously reflected upon by the EYT therapist and were regarded as specific for the healing process. For instance, the B exercise could initially only be done with a stiff and straight back; later the patient showed a soft bending of her back with an increasing relaxation in her shoulders, neck, and back and a stronger connection to her feet. The IAÅ exercise was initially conducted in an overformed manner, too quickly, and with tension and stiffness; later it became more relaxed and peaceful, and the patient showed signs of increased expressiveness and of coming to herself. The R exercise was also initially conducted with a straight back; later the patient was able to roll flexibly, elastically, and rhythmically through the breast region, neck, and lower back, she became warm, breathed more freely, and her cheeks became rosy.

A variety of these transitions could be observed in the course of EYT. After the final session, the mobility had substantially increased in the back, neck, and breast region; steps had become longer and foot movements more careful and more expressive; all movements were more fluid, "breathed out," and relaxed. This was observable in all exercises. In general, the movements evolved toward expressing self-confidence, lightness, and happiness.

The effects as observed by the therapist were in line with a reduced anxiety as experienced by the patient herself, observed by her physician, and recorded by her counselor.

Patient's Experiences

Very much has happened during those 8 weeks. Generally, I feel much better; I have more strength, I can get more done and I sleep better. I still have muscular pains and headaches, but to a much smaller extent. The anxiety attacks are nearly gone and that gives me a completely different peace of mind to get on with my daily life. Now I seldom have anxiety when I am socially with others. For example, I was able to go on a week's ski holiday to a little cottage together with friends. I feel lighter and happier. I have more and more self-confidence and was able to decide myself to return to work. Everything is functioning again.

Physician's Epicrisis

After the rehabilitation period (over the eight eurythmy sessions), the patient generally feels much better. Her condition has distinctly improved both physically and mentally: anxiety attacks and social fear have almost completely disappeared, sleep has significantly improved, headaches sometimes still occur but less intensively, and tension in shoulders and upper back is somewhat relieved. The patient's self-confidence has successively improved. She took initiative, decided to start work again, and has begun working at 50%. Sick leave was finally reduced to 0%. She has found her way back to her everyday self and feels that she can cope with her life situation out of her own inner strength. The treatment objective has been achieved to a high degree.

Long-term Follow-up

After 2.5 years, due to a combination of long journeys, demanding vocational studies, and care of her 1-year-old child, the patient's stress and anxiety increased; she returned to EYT and again found it helpful. Six months later, later obsessive compulsive disorder was diagnosed at another psychiatric outpatient clinic where the patient started treatment with Sertraline, a selective serotonin reuptake inhibitor, together with cognitive behavioral therapy. The latter was discontinued in June 2010.

Today, 6 years after the original treatment with EYT, the patient has had no further sick leave for anxiety. She relates that her anxiety had not been fully healed and her symptoms had waxed and waned but not as intensely as during the period described above. She says she has learned to cope and functions and feels well. She has been at home nursing her second child and has recently returned to work to finish her vocational training.

DISCUSSION

This case is remarkable because it gives detailed insight into the therapeutic process of a CAM intervention that seems to have contributed to the substantial improvement of a disabling anxiety syndrome.

A 21-year-old woman suffered from stress-induced anxiety.

She had experienced a psychological trauma in her childhood years and already then had suffered from several symptoms of anxiety. Both are well-known risk factors for the development of anxiety disorder.[9] The diagnosis had been confirmed independently by three attending physicians and also by a psychiatrist assessing the patient's journals from both the Family Physician Care Centre of the Vidarkliniken and from the adjacent Psychiatric Outpatient Care for Young People. A subclassification of the anxiety syndrome had not then been done; it may have been a generalized anxiety disorder, but it also may have overlapped with other anxiety disorders.

The additional diagnosis within the AM paradigm (Sidebar) pointed out a disturbance of the rhythmic system, possibly induced by a psychological trauma during the susceptible age period between 7 and 14 years of age. This diagnosis was confirmed by the EYT-therapist when assessing the patient's EYT-specific patterns of gestures and movements.

The therapeutic intention of EYT was to treat the rhythmic system disturbance and by doing so, alleviate the anxiety and support the patient's resilience. Accordingly, the exercises were chosen to influence the disturbed rhythmic functions: directly through specific rhythmical and expressive movement exercises and indirectly through consonant exercises to loosen tension. The therapist repeatedly observed an immediate transition of the indicated exercise movements into the patient's own movement and gesture patterns. Out of the exercises, the patient's movements became not only more fluent, flexible, elastic, and rhythmical, but also softer, lighter, and peaceful; increased relaxation became visible in different regions of the body. The body regions became integrated into the movement so that the patient experienced herself as a whole and showed increased expressiveness and self-confidence. Over the total course of the treatment, these improvements were successfully additive. They were paralleled by a very fast and marked improvement of anxiety symptoms and social functioning. The woman became socially active again and could resume work.

Treating anxiety disorders with a movement therapy that contains elements of art, relaxation, and meditation is also known in other therapeutic approaches. Psychological treatments are well established for this condition, and relaxation techniques, dance and movement therapies, autogenic training, meditation, and self-help approaches are frequently used and do show some evidence of effectiveness in clinical studies.[28,29] It has been pointed out that the effects of pharmacological treatments are often disappointing and limited to the timespan of actual medicine intake, and relapse is frequent after drugs are withdrawn.[10,12-16] Patients often seek complementary, especially cognitive and other nonpharmacological, treatments and may also prefer a nonverbal, artistic therapy.[17,28]

In our case, concomitant treatments, spontaneous improvement, and context effects have to be considered as potential confounders: The young woman had received supportive counseling as an outpatient at a psychiatric clinic. The counseling, however, had begun 3 months before and had not led to any improvement of the patient's functional capacity. On the other hand, the functional capacity improved quickly after the onset of EYT, which one would not have expected considering the previous duration of the disorder

ANTHROPOSOPHIC CONCEPT OF THE HUMAN ORGANISM AND PATHOGENESIS

I. The Four-level Concept of Formative Forces[20]

The anthroposophic concept of man claims that the human organism is not only formed by physical (cellular, molecular) forces but by four levels of formative forces: (1) formative physical forces; (2) formative vegetative forces that interact with physical forces and bring about and maintain the living form, as in plants; (3) a further class of formative forces (*anima*, soul) that interacts with the vegetative and physical forces, creating the duality of internal-external and the sensory, motor, nervous, and circulatory systems, as in animals; (4) an additional class of formative forces (*Geist*, spirit) that interacts with the three others and support the emanation of individual mind and the capacity for reflective thinking, as in humans.

II. The Three-fold Model of the Human Constitution[36,37]

When the four levels of formative forces are integrated with the human polarity of active motor movement and passive sensory perception, a three-fold constitution of the human being results. It embraces three major system constituents: two being polar to each other ("nerve-sense system" and "motor-metabolic system") and one being intermediate ("rhythmic system"). These subsystems are spread over the entire organism but predominate in certain regions: the nerve-sense system in the head region, the motor-metabolic system in the limb region, the rhythmic system in the respiratory and circulatory organs and thus in the "middle" region.

In these three subsystems, the four levels of formative forces are considered to interrelate differently. In the nerve-sense system, the upper two levels of forces (spirit, soul) are relatively separate from the lower two levels, thus providing the conditions for the origination of self-consciousness, conscious perceptions, and conscious thought processes. In the motor-metabolic system, the intermergence is closer, thus providing the conditions for the execution of personally intended bodily movements. In the rhythmic system, the interrelations of the upper and lower levels fluctuate between increasing and decreasing intermergence and are associated with the occurrence of feelings. The interrelations increase during the rhythmical lung process of inspiration and decrease during expiration.

The model of the threefold human constitution leads to various distinct reinterpretations of the conventional teachings of physiology.

III. The Concept of Periodic Maturation[38]

During the juvenile life span of a human organism, the major system constituents are considered to go through differentiated maturation periods of more or less 7 years' duration. During the first 7-year period, the rise of body command and

(*continued, next page*)

and its character. Such rapid improvement is less likely due to an ongoing counseling already proceeding for months, though it might still have contributed to the improvement. Similar considerations may also apply to the AM medication before and during EYT. In systematic reviews, herbal intervention was not found to be very effective for anxiety.[28] Massage and resting before EYT may have contributed to the relaxant effect of EYT but did not cause it alone, since the patient was still tense at the beginning of the EYT session.

Improvement of the anxiety solely due to spontaneous course of disease is unlikely in view of the described dynamic of the clinical picture and complaints. Particularly, it could not explain the repeatedly observed immediate improvements in the patient's movement and gesture patterns when doing the specifically corresponding EYT exercises. Furthermore, anxiety disorder is a chronic disease, and spontaneous remission is not common: in controlled clinical trials, untreated patients with anxiety disorders did not show substantial improvement of the anxiety symptoms.[30] In addition, context effects may have influenced the course of disease, but they would be regarded as an integral part of the total AM approach.[31]

A limitation of the case report is the lack of a formal instrument to assess the severity of the disease and its improvement during follow-up. However, this case was drawn from a routine primary outpatient setting and therefore mirrors medical reality. Some of the available questionnaires used in clinical research may also be useful for clinical practice and facilitate a more quantitative assessment.[32-35] Still, as anxiety is a subjectively experienced illness, the personal account of the patient is what matters in the end.

In this patient, anxiety did substantially improve but was not completely resolved. Anxiety is a chronic disease, and 6 years after the treatment period, the patient reported relapses and underwent treatments with cognitive therapy, Sertraline, and EYT. Again, EYT was helpful. Altogether, the anxiety relapses became less intense, and the patient now is able to fully participate in social life.

This clinical observation from a routine practice is concordant with the results of a major 2-year prospective cohort study conducted in Germany that evaluated AM therapies in chronic diseases in 141 AM practices. Sixty-four patients with anxiety disorder were included, 33 of whom had been treated with EYT as primary treatment. These consecutively treated and prospectively documented patients showed a statistically significant and long-term improvement of symptoms and of quality of life (Figure).[22]

Compared to that study, the present report goes into more detail about the concept and the implementation of EYT. It suggests that properly applied, EYT can be helpful for anxiety patients who have a preference for nonverbal and artistic therapies; do not improve with standard therapy; find these therapies to be too passive (anti-anxiety medication), too intrusive, or too verbal (psychotherapy); or suffer from adverse reactions.

Anxiety disorders are a major health concern with substantial impairment of quality of life. Many patients do not or only temporarily respond to established treatments and prefer complementary interventions, particularly nonverbal and artistic approaches. Since EYT shows promising results for this indication, further studies should be conducted.

dexterity prevail, along with a predominant differentiation of the nerve-sense-system. During the second 7-year period, the growing awareness of the child's own emotions and increasing experience of his or her own separate inner world prevails, along with a differentiation of the rhythmic system (eg, the pulse/breathing ratio[39]). During the third period, the development of free will and autonomous personality (adulthood) prevails, accompanied by the final differentiation of the motor-metabolic system, starting with the sexual maturation at the beginning of this period.

Specific vulnerabilities are seen in these periods. For example, in the second 7-year period, the child is often sensitive to outer pressure and reacts with symptoms in the metabolic system (stomachache) and/or the nerve-system (headache) since the rhythmical system is not yet strong enough to balance the two other system constituents. In this period, the rhythmical system's own disturbances need not result in grossly anatomical defects but rather in mental/emotional symptoms (eg, depression or anxiety[40-42]).

IV. Dislocative Pathogenesis[43] and the Breathed-in-upwards Syndrome

As a matter of pathogenesis, the region-specific types of the four-level interrelations can be dislocated into other areas of the organism. For instance, the specific type of the four-level interrelations that accompanies the lung process of inspiration can shift towards the upper regions of the organism (breast, neck and head). In such a case, one will encounter a pathological state, which is called the breathed-in-upwards syndrome in the present article.[44]

This dislocation finds its expression in the respective person as being alert, light, lively, engaged; when more intensified, the person becomes wound up, tense, overexcited, uneasy, and nervous. In an extreme case, one may feel out of control or even psychotic. With the contrary dislocation (ie, the breathed-out-downwards syndrome), the person would feel like letting go, centered, grounded, and relaxed; when more intensified, the person may feel heavy, dull, indifferent, and depressed. In extreme cases, the person may lose consciousness.

No adverse effects were observed in our patient. Still, treatment of patients with EYT should be restricted to trained EYT therapists. Furthermore, EYT might not be sufficient as a sole treatment, and other interventions might have to be added or applied later. Patients should be carefully and regularly monitored by doctors regarding the course of anxiety as well as potentially overlapping comorbid disorders.

CONCLUSION

In a patient with stress-induced anxiety, EYT seems to have been an effective treatment. This case report offers insight into the anthroposophic conceptualization of life functions and their pathological deviations and the way they are used for diagnosis

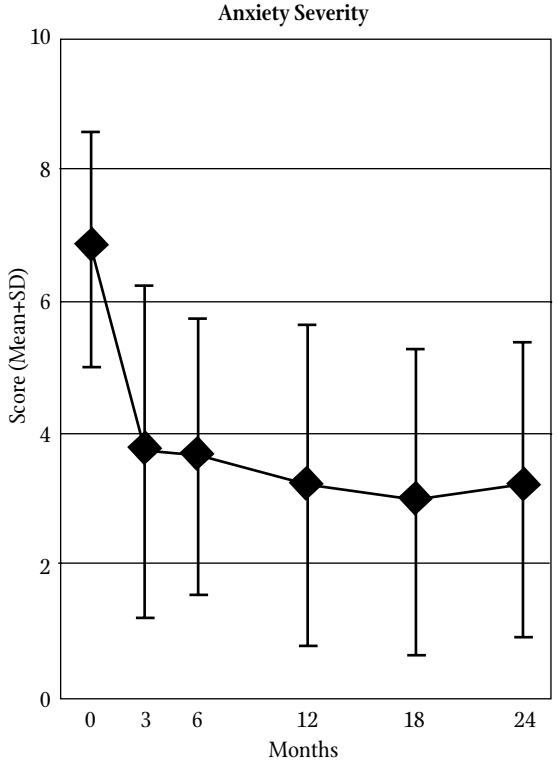

FIGURE Anxiety Severity

Patient rating, Range: 0 "not present," 10 "worst possible." Patients referred to eurythmy therapy for anxiety disorder, n = 33. Adapted from Hamre HJ et al.[22]

and treatment. Further studies are warranted to assess EYT in anxiety patients.

Informed consent

The patient is in full agreement with publication of her case; she read the final version of the case report (August 11, 2010) and confirmed its contents.

Acknowledgment and Conflict of Interest

The case presentation was part of a training course in writing reports relating to cognition-based medicine. The course received funding from Christopherus Stiftungsfond, Mahle Stiftung, Software AG Stiftung, Vidarkliniken, Vidarstiftelsen, Wala GmbH, Weleda AG, and Zukunftsstiftung Gesundheit. No sponsor had any influence on the design, execution, interpretation, or writing of the case report. All authors declare that they have no conflict of interest.

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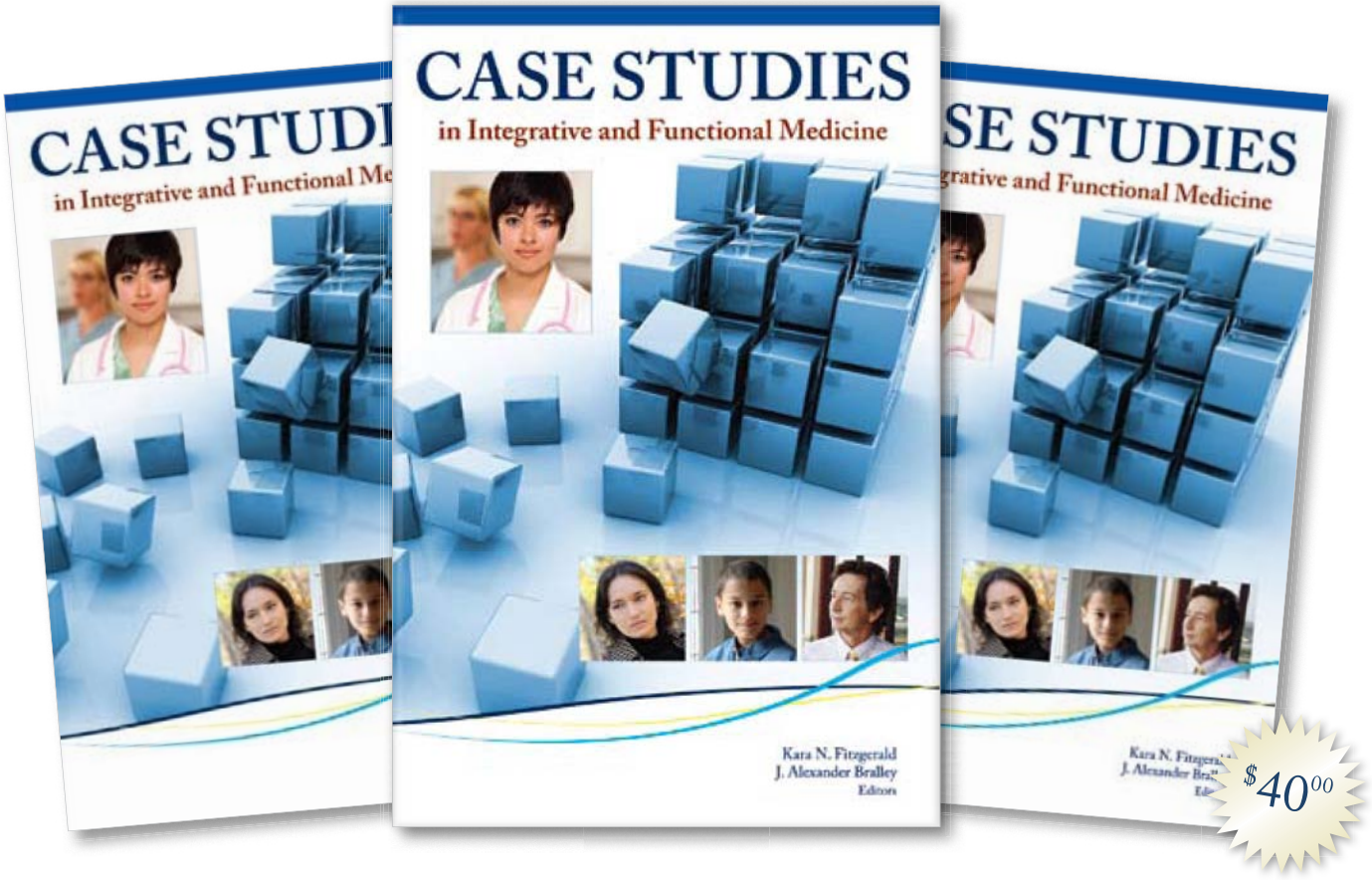

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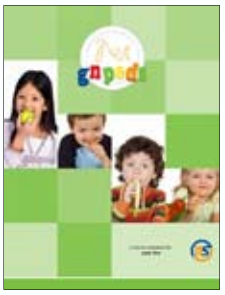

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