
**DANCE MOVEMENT THERAPY IMPROVES
EMOTIONAL RESPONSES AND MODULATES
NEUROHORMONES IN ADOLESCENTS
WITH MILD DEPRESSION**

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This study assessed the profiles of psychological health and changes in neurohormones of adolescents with mild depression after 12 weeks of dance movement therapy (DMT). Forty middle school seniors (mean age: 16 years old) volunteered to participate in this study and were randomly assigned into either a dance movement group ($n = 20$) or a control group ($n = 20$). All subscale scores of psychological distress and global scores decreased significantly after the 12 weeks in the DMT group. Plasma serotonin concentration increased and dopamine concentration decreased in the DMT group. These results suggest that DMT may stabilize the sympathetic nervous system. In conclusion, DMT may be effective in beneficially modulating concentrations of serotonin and dopamine, and in improving psychological distress in adolescents with mild depression.

Keywords adolescent, dance movement therapy, depression, emotion, neurohormone

INTRODUCTION

In Korea, clinical depression affects about 8% of adults and 14% of 14- to 18-year-old adolescents each year (Yang, 1997). Depression is characterized by a variety of symptoms including feelings of sadness, irritability, changes in sleep and appetite, feelings of worthlessness, loss of pleasure from enjoyable activities, and psychomotor retardation (American Psychiatric Association, 1994). Depression is twice as prevalent in females as males and the risk of a recurrence can be as high as 50–90% (Preskorn, 1999; Singh et al., 1997).

The standard medical treatment for depression primarily involves psychotherapy and pharmacological interventions (Preskorn, 1999). The side effects and ineffectiveness of these therapies have led to the search for effective nonpharmacological treatments that might be effective either alone or as adjuncts to drug therapy.

Dance and rhythmic movement have been used to enhance expression and modify emotions for centuries. Dance movement therapy (DMT) has

been used as a form of art therapy in the Western world since the early 1950s (Berrol, 1990; Palo-Bengtsson & Ekman, 1997). DMT combines music, light exercise, and sensory stimulation, and could provide a nonpharmacological treatment of mild depression. A recent summary of research reported that DMT aids recovery from the psychosocial and psychophysical effects of physical trauma and diseases such as cancer, heart disease, neurological impairments (e.g., hemiplegia or brain injury), systemic lupus erythematosus, chronic pain, and after surgery (e.g., limb amputation) (McKibben, 1988, cited in Bibbell-Hope, 2000). The literature suggests that DMT produces both subjective and objective improvements including redefining and strengthening body image; clarifying ego boundaries; providing an outlet for relief of physical tension, anxiety, and aggression; reducing cognitive and kinesthetic disorientation; increasing the capacity for communication, pleasure, fun, and spontaneity; and support for therapeutic medical goals (Seide, 1986). Other research studies describe the use of DMT with patients with specific diseases including cardiac disease, AIDS, cancer, and neuropathology (Chang, 1988, cited in Bibbell-Hope, 2000).

Many of these studies have reported improvements in overall psychosocial adjustment as determined from subjective statements by the participants, or by clinical observations by health professionals. However, there has been little research directed specifically at determining the effectiveness of creative arts therapy in general, and DMT in particular, in treating depression. The purpose of this study was to investigate the efficacy of DMT in reducing the negative psychological symptoms of mild depression in adolescents and to identify the mechanisms underlying these effects.

METHODS

Subjects

Volunteers were recruited from a girls' middle school in Iksan, Korea. Three hundred and forty-seven subjects responded to a questionnaire that included the Beckman Depression Inventory, of which 300 (86.5%) were completed. Of the respondents who completed the questionnaire, 112 subjects with higher depression scores were selected as possible subjects. Subjects were then selected from this group of 112 using the following criteria: (a) no past or present diagnosis of psychiatric or internal illness, (b) no neuroendocrine disorders, (c) no history of regular exercise within the past six months, (d) not using prescription medication or any other therapeutic treatment for

depression, (e) no habitual smoking or drinking, and (f) parental permission to participate. Any subject who failed to meet one of these criteria was excluded from the study.

Seventy-five girls entered the initial phase of the study. Before enrolling in the study, potential subjects underwent a pretreatment assessment of symptoms over four weeks to confirm a diagnosis of depression. Of the 75 subjects, 24 were excluded from the study because they could not be diagnosed as having symptoms of depression; 51 subjects were enrolled in the experiment. Forty subjects were randomly selected from the 51 and then were randomly assigned to either a dance-movement group ($n = 20$) or a control group ($n = 20$) by a secretary who was blind to the experimental procedures. The study received institutional approval from the Human Investigation Ethics Committee and administrative approval from the university before the subjects were approached to obtain written consent from their parents. Parental consent was given using a form from the Human Subjects Review Board of the Wonkwang University Hospital and School of Medicine.

Measurement of Psychological Distress (SCL-90-R)

All subjects completed a self-report inventory of emotional distress, the Symptom Check List-90-Revision (SCL-90-R) (Derogatis, 1977). To report the data, the raw scores on the SCL-90-R have been converted to standard T scores and normalized to a non-patient population in Korea. The clinical profiles of the SCL-90-R include dimensions of somatization (SOM), obsessive-compulsive (O-C), interpersonal sensitivity (I-S), depression (DEP), anxiety (ANX), hostility (HOS), phobic anxiety (PHOB), paranoid ideation (PAR), and psychoticism (PSY). The global scores of the index are presented as the global severity index (GSI), positive symptoms total (PST), and positive symptoms distress index (PSDI).

Measurements of Neurohormones

Plasma serotonin and dopamine concentrations were measured using high performance liquid chromatography with electrochemical detection at 0.65 V by the Center of Pathology in the Green Cross Reference Laboratory. Commercial radioimmunoassay kits were used to determine plasma cortisol concentration (CIS Bio International, France). The assay for cortisol was performed at the Center of Clinical Pathology in Wonkwang University Hospital.

Therapy Sessions

The treatment group participated in a 45-min DMT session 3 times a week for 12 weeks. The DMT sessions were designed around four major themes: (a) awareness of the body, the room, and the group; (b) movement expressions and symbolic quality of movement; (c) movement, feeling, images, and words; and (d) differentiation and integration of feelings. Each of these themes included various sub-themes: (a) setting limits and outer, inner, and personal space; (b) body language, the reflecting process, polarity, and inward and outward expression; (c) playing, drawing, and verbalization; and (d) the inner sense, quality of movement, and expression of feelings.

The subjects in the control group did not participate in the treatment described earlier, but were invited to participate in a similar program after the end of the study.

Statistical Analysis

The results were analyzed using a repeated measures analysis of variance using SAS software. The unpaired *t*-test was used to compare the demographic data in the two groups. The paired *t*-test was used to compare values at baseline and after 12 weeks.

RESULTS

The demographic characteristics for the DMT group and control group are shown in Table 1. The groups did not differ significantly in age, height, weight, and body mass index.

The SCL-90-R profiles for each group are shown in Table 2. All SCL-90-R subscale scores decreased significantly in the DMT group. There were

Table 1. Homogeneity test for general demographic characteristics between two group

Variables	DMT (<i>n</i> = 20)	Control (<i>n</i> = 20)	<i>t</i>	<i>p</i>
Age (years)	16.0	16.0		
Height (cm)	161.9 ± 5.6	160.5 ± 5.4	0.76	0.45
Weight (kg)	57.4 ± 9.3	52.8 ± 7.3	1.84	0.74
BMI (kg/m ²)	21.9 ± 3.3	20.5 ± 2.6	1.44	0.13

Values are mean ± standard deviations. BMI: body mass index.

Table 2. The mean psychological symptoms scores of the DMT group and the control group

Variables	DMT (<i>n</i> = 20)		Control (<i>n</i> = 20)		Group × time	
	Pre	Post	Pre	Post	<i>F</i> (1,92)	<i>p</i>
SOM	51.4 ± 9.9	45.6 ± 6.9	42.7 ± 4.0	45.9 ± 4.0	42.7	0.001
O-C	50.9 ± 8.9	47.2 ± 9.2	46.4 ± 7.7	47.8 ± 7.2	24.3	0.001
I-S	51.8 ± 10.1	44.3 ± 8.2	47.9 ± 7.1	51.1 ± 6.7	90.1	0.001
DEP	51.8 ± 11.8	46.4 ± 10.2	43.6 ± 6.2	46.1 ± 5.7	68.1	0.001
ANX	51.2 ± 11.7	45.3 ± 10.3	45.0 ± 6.6	47.8 ± 6.5	57.6	0.001
HOS	55.9 ± 14.7	51.1 ± 12.0	50.0 ± 8.2	51.1 ± 8.5	30.3	0.001
PHOB	49.4 ± 10.2	45.7 ± 8.0	44.6 ± 6.8	46.6 ± 7.2	47.5	0.001
PAR	56.5 ± 15.2	51.7 ± 13.2	45.7 ± 7.6	46.1 ± 7.3	30.0	0.001
PSY	54.9 ± 11.7	49.4 ± 10.8	46.9 ± 8.3	48.1 ± 8.5	651.8	0.001

Values are mean ± standard deviations.

significant main effects of time ($p < .05$) and group × time interaction ($p < .01$), but no effect of group for all subscales of the SCL-90-R except SOM. For SOM, the group × time interaction and group effect were significant, but there was no main effect of time.

Table 3 displays the baseline levels and changes after 12 weeks of DMT on the global indices. The levels of GSI, PST, and PSDI decreased significantly after 12 weeks in the DMT group but increased slightly in the control group. For the GSI, there were significant main effects of time [$F(1, 38) = 9.4$; $p < .005$] and group × time interaction [$F(1, 92) = 126.7$; $p < .001$], but no significant group effect. For PST, there was a significant effect of time [$F(1, 38) = 9.8$; $p < .005$] and group × time interaction [$F(1, 92) = 88.2$; $p < .001$].

Table 3. The mean global score profiles of the DMT group and the control group

Variables	DMT (<i>n</i> = 20)		Control (<i>n</i> = 20)		Group × time	
	Pre	Post	Pre	Post	<i>F</i> (1,92)	<i>p</i>
GSI	51.3 ± 11.9	47.4 ± 11.7	44.5 ± 6.2	46.7 ± 6.2	126.7	0.001
PST	54.2 ± 10.8	50.7 ± 10.8	48.5 ± 6.1	48.5 ± 6.3	88.2	0.001
PSDI	48.8 ± 9.8	43.4 ± 10.2	43.9 ± 7.2	45.2 ± 5.7	24.5	0.001

Values are mean ± standard deviations.

.001], but no significant effect of group. For PSDI, there was a significant main effect of time [$F(1, 38) = 9.3; p < .005$] and group \times time interaction [$F(1, 92) = 24.5; p < .001$], but no significant effect of group.

Figure 1 shows the plasma hormone concentrations. Cortisol concentration did not change significantly in either group and there was no group \times time interaction (Figure 1A). Plasma serotonin concentration increased after 12 weeks in the DMT group but declined in the control group (Figure 1B). There was a significant main effect of time [$F(1, 38) = 7.6; p < .01$] and group \times time interaction [$F(1, 38) = 9.8, p < .005$], but no significant group effect. For plasma dopamine concentration, only the group \times time interaction was significant [$F(1, 92) = 27.0; p < .001$] (Figure 1C).

DISCUSSION

This study was designed to measure the effects of DMT on the psychological symptoms and plasma concentrations of neurohormones in adolescent female students with mild depression. It was found that the negative psychological symptoms were improved by 12 weeks of DMT, but not in the control group. Furthermore, there were significant changes in the levels of serotonin and dopamine.

The DMT group showed significant improvements in negative psychological symptoms such as somatization, obsessive–compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. These results are consistent with previous reports showing that DMT reduces emotional disturbance, relieves tension, and improves self-esteem. These effects may result from physiological changes such as muscle relaxation and changes in the concentration of stress hormones (Bartenieff, 1980; Bojner-Horwitz et al., 2003; Leste & Rust, 1990; Westbrook & Mckibben, 1989).

Modulation of serotonin and dopamine production might be the mechanism responsible for the observed reduction in depression and improvements in psychological symptoms in the DMT group. Concentrations of serotonin and dopamine are directly or indirectly related to fatigue, stress, insomnia, and psychological symptoms (Davis & Bailey, 1997; Dishman, 1997; Meeusen et al., 1997). The increased plasma serotonin concentration and decreased dopamine concentration suggest possible therapeutic effects on depression in the DMT group. The finding of increased plasma serotonin concentration and decreased dopamine concentrations after 12 weeks of therapy in the DMT group could suggest possible therapeutic effects on depression.

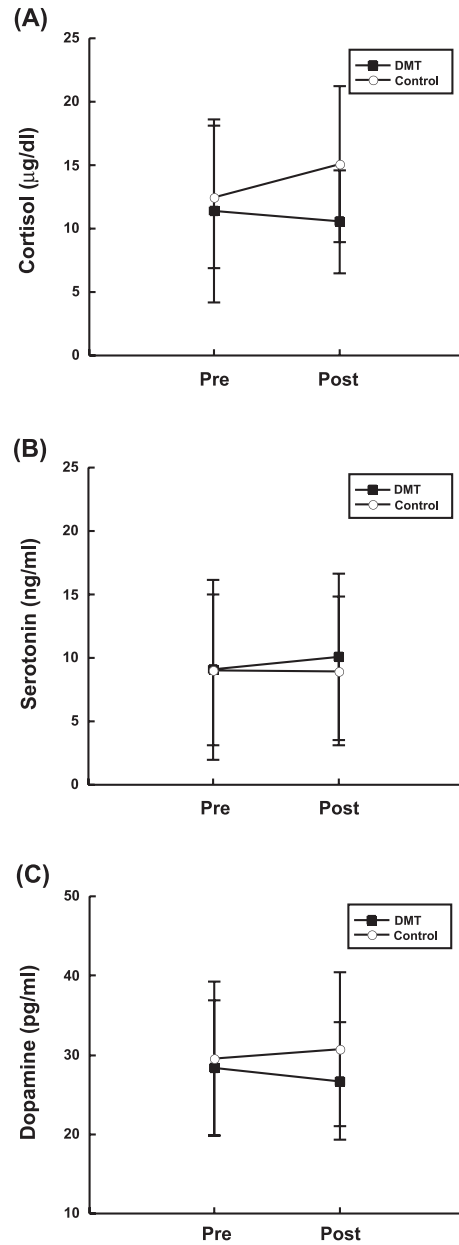


Figure 1. Effects of dance movement therapy (DMT) on plasma concentrations of (A) cortisol, (B) serotonin, and (C) dopamine. There were group \times time interaction in serotonin [$F(1, 38) = 9.8, p < .005$] and dopamine concentrations [$F(1, 38) = 27.0, p < .001$].

In conclusion, these results showed that 12 weeks of DMT improved the negative psychological symptoms and modulated serotonin and dopamine concentrations in adolescent girls with mild depression. These data suggest that DMT has relaxation effects, stabilizes the sympathetic nervous system, and may be beneficial in improving the symptoms of mild depression. DMT may provide a simple, inexpensive, and practical therapy for depression in adolescents. However, it is acknowledged that this was a preliminary study with several limitations, such as a small sample size and the lack of an equivalent exercise control group to estimate an expectation effect. Further randomized studies that include more objective measures, larger sample sizes, measurements after multiple sessions, and long-term follow-up are needed to show the effects of a home-based daily exercise program on well-being, psychological variables, and other biochemical variables in patients with mild depression.

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