

The effects of sandplay therapy on the depression, anxiety and saliva cortisol of university students with ADHD tendencies

Yoon-jung Lee^{*}

Mikyung Jang^{**}

<Abstract>

This study preformed sandplay therapy, a type of individual psychotherapy, targeting college students with ADHD tendencies to determine whether the therapy was effective in reducing their depression, anxiety, and saliva cortisol which is a biochemical indicator of stress. This research used Conners' Adult ADHD Rating Scale-Korean Version (CAARS-K), Beck's Depression Inventory (BDI), and State-Trait Anxiety Inventory (STAI), targeting 797 college students in the central region of Korea. Among the participants who fell into the top 20% and displayed high levels of depression and anxiety in Conners' ADHD rating scale, eight students who agreed to the experiment were finally selected. The sandplay therapy program was conducted for a total of ten weeks, one session per week, 45 minutes per session. pre-tests and post-tests questionnaire surveys were conducted and saliva cortisol samples were collected on a biweekly basis pre-tests and post-tests each session during the program. The statistical programs used to verify the effectiveness of this study were SPSS 15.0 Version and the Wilcoxon Rank Sum-Test, a non-parametric statistical process, was performed to verify the pre-tests and post-tests effect of each variable. The results indicated that sandplay therapy was effective in reducing their depression, state-trait anxiety, and the secretion of cortisol, a hormone related to endocrine stress.

Keywords : ADHD, depression, anxiety, saliva cortisol, sand play therapy

^{*} Corresponding Author : Yoon-jung Lee, Sandplay therapist & psychotherapist, Namseoul University
Children and Family Counseling Center (snyntt@hanmail.net)

^{**} Mikyung Jang, Professor, Department of Child Welfare, Namseoul University

I. Introduction

1. Necessity and purpose of the study

Attention Deficit Hyperactivity Disorder (ADHD) is a neurobiological disorder that is frequently found in preschool or school age children. It is a representative childhood disorder characterized by symptoms such as inattention, impulsivity, and hyperactivity that persist until adulthood without being replaced by other symptoms (Cantwell, 1996; Cho, 2001). According to Murphy & Barkely (1996), childhood ADHD prevalence rates are approximately 4%. Therefore, in view of the follow-up report (Biederman et al., 2000) which indicated that approximately 60% of children who are diagnosed with ADHD maintained major symptoms until adulthood, adult ADHD prevalence rates are assumed to be approximately 2~3% (Barkley, 2005; Conners et al., 1999; Weiss & Hechtman, 1993).

Although there is as yet no consensus on the major symptoms of or diagnostic criteria for adult ADHD, given that ADHD is a disorder that persists throughout the life of the patient, the symptoms can be understood from the viewpoint of development studies. ADHD children experience difficulties such as intelligence problems, learning disabilities, and study problems, resulting in poor scholastic achievements, due to their characteristics such as inattention, impulsivity, and hyperactivity. They also have secondary problems including difficulties in social relations, resulting in exclusion from peer relationships, because of their characteristics such as not obeying the rules in games or sports, trying to win at any cost, being too loud and talkative, and more oppressive than their peers in social situations such as home or school (Lee, 2006).

In particular, ADHD children experience frequent failures in peer relationships, frustration due to poor academic performance and resultant negative feedback and punishment from their teachers, parents and peers, giving rise to low self-esteem and a sense of frustration (Lewis, 1991; Milich & Laundau, 1982). It has been observed that the continuous exposure of ADHD children to negative situations exacerbates their emotional problems, leading to depression, anxiety, low self-esteem, and drug abuse (Ivens & Rehm, 1988; Lee & Bang, 1998; Mitchell et al., 1988; Pliszka, 2000; Shin et al., 2000).

Meanwhile, ADHD appearing in adulthood shows symptoms similar to those of ADHD in adolescence. As those with ADHD experience repeated failures and frustrations in their daily lives such as poor study and work performance, low socioeconomic status and frequent changes of jobs, their internalized emotional problems such as low self-esteem, depression, and anxiety worsen (Brown, 1993; Cho, 2001; Jang, 2004), leading to externalized problems such as antisocial personality disorders (Donnellan et al, 2005), alcohol and drug abuse (Stein et al., 2002). In particular, when hyperactivity symptoms persist into adulthood, the risk of other mental pathologies that may accompany those symptoms also increases (Kim et al., 2008). Therefore, adult ADHD patients require therapeutic interventions in their secondary problems along with the aforementioned primary major symptoms of ADHD. Moreover, adults with ADHD tendencies also exhibit anxiety and depressive disorders in many cases, and the stress they experience in their daily lives increases because of their low self-esteem that has persisted from their childhood (Barkely, 2006; Biederman et al., 1991; Dilsaver et al, 2003; Kim, 2010; Lee, 2009; MTA Cooperative Group, 2000; Pliszka, 2000; Tannock, 2000).

Thus far, ADHD has been treated by medication using analeptic drugs such as D- amphetamine and methylphenidate or antidepressants such as imipramine (Kim & Song, 2009). However, since this medication cannot relieve all ADHD symptoms, the medication is combined with other methods such as parent and family counseling, special care, action therapy and psychotherapy. In particular, psychotherapy for secondary problems such as depression, lack of confidence and conflicts in human relations can greatly help to solve problems that accompany ADHD (Eun & Eun, 2008).

Sandplay therapy is a psychotherapeutic approach that is intended to induce clients to relinquish their self-defensive attitudes and materialize their own inner worlds by connecting their consciousness with their unconsciousness through the use of diverse symbols together with sand. Clients can achieve the integrity and all-ness of their personality in terms of the basic premise that humans have self-healing power deep in their unconsciousness. The therapist watches the clients' processes while helping them to freely express their unconscious thoughts, emotions and feelings in safe and protected spaces - the sand box and treatment room - with

the therapist, listening to what they express and providing opportunities for insights into themselves so that they can positively reconstruct their thoughts, emotions and feelings, thereby promoting their growth (Jang et al., 2012).

Sandplay therapy can be utilized as a treatment to deal with the emotional problems of adults with ADHD tendencies and can be an effective measure to lower the level of their stress and relieve their negative emotions such as anxiety and depression through their gaining of insights into themselves. According to a previous study (Kang et al., 2012) in which sandplay therapy was implemented on parents of children who visited a child counseling center, sandplay therapy reduced depression and stress values and brought about changes in stress and depression-related brain waves. Sandplay therapy was shown to be effective in relieving depression and anxiety in a study conducted on ADHD adults (Kim, 2010), and was also shown to be effective in a study that examined changes in the low self-esteem, depression, and human relations of ADHD adults (Jang, 2010).

However, most previous studies verified the effectiveness of sandplay therapy based on self-reporting answers. Therefore, in the present study, changes in saliva cortisol values which are a biochemical indicator of stress were measured in order to check the neurophysiological effects of psychotherapeutic interventions in university students with ADHD tendencies.

Cortisol is a steroid hormone also known as hydrocortisone that serves the function of increasing the concentration of blood sugar in order to supply the necessary energy to adapt to frequently changing internal/external environments (King & Hegadoren, 2002). Cortisol is secreted from the adrenal gland to increase heartbeat or blood pressure (Lupien et al., 2007) and its value increases when stress is felt (Dahlgren et al., 2005). Cortisol responds more selectively to stimuli compared to other stress hormones and responds well to physical stress, acute stress such as anxiety, and mental stress such as a lack of control or depression. Therefore, the secretion of cortisol tends to increase when stress occurs.

Therefore, the present study was intended to examine whether sandplay therapy is effective in reducing the levels of depression and anxiety in university students at the beginning of their adulthood resulting from ADHD tendencies, and to measure the level of

saliva cortisol that is a biochemical indicator of stress in order to verify the effects of sandplay therapy on changes in the level of emotions as reported by clients and on changes in their hormone secretion.

II. Study method

1. Study subjects

In the present study, a questionnaire survey including the Korean versions of Conners' ADHD rating scale (CAAR-K), Beck's depression scale (BDI), and the state-trait anxiety scale (STAI) were administered to 797 students at a university located in the central region between May 1 - 30, 2011 as a pre-tests. Out of the students, 49 students that fell into the top 20% of the respondents in their scores on Conners' ADHD rating scale and showed high levels of both depression and state-trait anxiety scale scores were selected, and volunteers who would participate in the program were recruited from them from August 10 - 31, 2011. Through this process, a total of 10 students participated in the program. Two of the participants quit during the program for personal reasons and, consequently, a total of eight students completed the program. The program was implemented individually once a week for 45 minutes for a total of 10 weeks from September to December 2011, and a total of eight students, excluding the two who quit for personal reasons, were selected as final study subjects. The proportion of males and females was 50% and their mean age was 20.5 years. The personal data of the eight study subjects are as shown in Table 1.

Table 1. Personal data of the study subjects

Subject	Age	Sex	Subject	Age	Sex
A	19	Female	E	19	Male
B	20	Female	F	18	Male
C	23	Male	G	20	Female
D	22	Female	H	23	Male

2. Measuring tools

1) Conners' adult ADHD rating scale korean version (CAARS-K)

In the present study, the Korean version of Conners' adult ADHD rating scale (1999), translated by Kim et al. (2005), was used in order to select university students with ADHD tendencies. The CAARS-K consists of a total of 66 items under seven subscales, including four subscales developed by Conners, using the Likert scale for 0~3 points, two DSM-IV symptom scales, and an ADHD index. In the present study, the internal consistency (Cronbach's α) of the items was .97.

2) Beck's depression inventory (BDI)

In the present study, the Korean version of Beck's Depression Inventory (1967), as translated by Lee and Song (1991), was used in order to measure depression symptoms. The BDI is a self-reporting test for measuring the severity of depression which consists of a total of 21 items covering emotional, motivational, cognitive and physiological symptoms. Each item is scored in a range of 0 to 3 points so that the range of the entire score is 0~63 points and high scores means higher levels of depression. In the present study, the internal consistency (Cronbach's α) of the items was .74.

3) State-trait anxiety inventory (STAI)

The STAI is a scale developed by Spielberger et al. (1970) that consists of 20 STAI-X1 scale items for measuring state anxiety and 20 STAI-X2 scale items for measuring trait anxiety. The state anxiety scale is related to the feelings of subjects in special states and the trait anxiety scale is related to the general feelings of subjects. The STAI has been designed so that when X1 and X2 items are to be answered simultaneously, the answers to X1 should be presented first and higher scores are regarded as indicating high levels of excessive concerns and fears. In the present study, the internal consistency (Cronbach's α) values of the state and trait anxiety items were .74 and .69 respectively.

4) Saliva cortisol value

Cortisol is secreted through the adrenal cortex as a response by the body to stress stimuli. Cortisol can be collected in diverse forms, including blood, urine and saliva. Of the forms, saliva collection is a method that is particularly useful because it can reduce the subject's additional stress. Therefore, in the present study, saliva was collected and analyzed to check whether sandplay therapy is effective in reducing ADHD adults' excessive stress. Given that cortisol responds sensitively to external stimuli, in order to collect cortisol for pre-tests the subjects were instructed to take a rest in a specially-prepared space thirty minutes before sandplay therapy began, and then they were requested to gargle their mouth with cold water and collect 1~2ml of saliva in a salivate container. Cortisol for post-tests was also taken by collecting saliva in the same method one minute after the sandplay therapy was finished. The collected specimens were immediately frozen at -20°C and component analyses for the specimens were requested. Cortisol was then collected biweekly in order to identify changes in the subjects' cortisol secretion rates during the program.

3. Study design and procedure

The present study was conducted in accordance with the one-Group Pre-test Post-test Design. First, as pre-tests, the study subjects were tested with the Korean version of Conners' adult ADHD rating scale (CAARS-K), Beck's depression scale (BDI) and the state-trait anxiety scale (STAI). Then those subjects who showed high levels of both depression and state-trait anxiety were selected from university students with ADHD tendencies among the subjects. Thereafter, eight subjects who agreed to participate in the program among the selected subjects were selected as final study subjects and administered with individual sandplay therapy programs once a week for 45 minutes for 10 weeks. The subjects' linguistic and non- linguistic expressions made while they were making sand scenes were recorded on record sheets with the subjects' consent. The entire process of the program was videotaped and the subjects' sand boxes were photographed.

4. Data analysis

Among the collected data, the quantitative data was analyzed using the SPSS 15.0 program, which is a computer statistics program, and Wilcoxon Rank Sum Tests, which are non-parametric tests, were conducted to verify the differences between before and after the program. Cronbach's α was calculated to grasp the reliability of each scale. In addition, analyses of the collected specimens of saliva cortisol were requested from an institution which specializes in clinical laboratory tests in order to calculate the values of the specimens, and the results were verified.

III. Study results

1. Depression of university students with ADHD tendencies

Wilcoxon Rank Sum-Tests were conducted on the differences in the depression scores of the study subjects pre-tests and post-tests the implementation of the program in order to examine whether sandplay therapy relieved the depression of university students with ADHD tendencies, and the results as shown in Table 2 were obtained.

Table 2. Differences in the depression of university students with ADHD tendencies between pre-tests and post-tests the implementation of the programs

Variable	Pre-Post	N	Mean	Standard deviation	Z
Depression	Pre	8	17.37	9.41	-2.20*
	Post	8	9.87	6.42	

* p <.05

As shown in Table 2 the scores of the variable depression pre-tests and post-tests the implementation of the program showed statistically significant differences ($z=-2.20$, $p<.05$).

The mean score of depression pre-tests the implementation of the programs was 17.37, which was a moderate state of depression, and the mean score of depression pre the implementation of the program was shown to be 9.87, which is a normal level. This result indicates that sandplay therapy indeed relieves the depression of university students with ADHD tendencies.

2. Anxiety of university students with ADHD tendencies

Wilcoxon Rank Sum-Tests were conducted on the differences in the state-trait anxiety scores of the study subjects pre-tests and post-tests the implementation of the program in order to examine whether sandplay therapy would relieve the state-trait anxiety of university students with ADHD tendencies, and the results as shown in Table 3 were obtained.

Table 3. Differences in the state-trait anxiety of university students with ADHD tendencies between pre-tests and post-tests the implementation of the programs

Variable	Pre-Post	N	Mean	Standard deviation	Z
State anxiety	Pre	8	42.71	4.82	-2.37*
	Post	8	26.57	10.27	
Trait anxiety	Pre	8	48.00	5.41	-2.37*
	Post	8	31.85	7.75	

*p<.05

As shown in Table 3, in the comparison between the pre-tests and post-tests, the sub- variable state anxiety showed statistically significant differences ($z=-2.37$, $p<.05$). The mean of state anxiety scores in the post-tests (26.57) was lower than that in the pre-tests (42.71) by approximately 16 points. The differences in the sub-variable trait anxiety between the pre-tests and post-tests were also shown to be statistically significant ($z=-2.37$, $p<.05$). The mean of the trait anxiety scores in the post-tests (31.85) was lower than that in the pre-tests (48) by approximately 16 points. Therefore, it can be seen that sandplay therapy is effective in relieving the state-trait anxiety of university students with ADHD tendencies.

3. Saliva cortisol values of university students with ADHD tendencies

In comparisons of saliva cortisol values conducted to determine whether sandplay therapy reduces the saliva cortisol values of university students with ADHD tendencies, the results as shown in Table 4 were obtained. As shown in Table 4, according to the results of the comparisons of mean saliva cortisol values of all subjects pre-tests and post-tests the implementation of the sandplay therapy program by session, saliva cortisol values had significantly decreased ($z=-2.02$, $p<.05$). This means that participation in the sandplay therapy program reduced the subjects' secretion of saliva cortisol.

Table 4. Verification of differences in mean cortisol values of all subjects with ADHD tendencies

Variable	Session	N	Mean	Standard deviation	Z
Cortisol	pre	8	1.34	.28	-2.02*
	post	8	.79	.14	

* $p<.05$

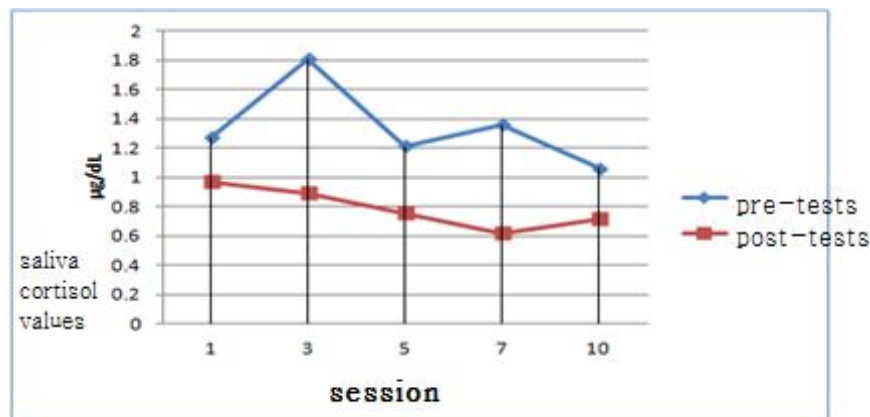


Figure 1. Comparison of mean saliva cortisol values of all subjects pre-tests and post-tests the sessions

As shown in Figure 1, the graph of the comparison of cortisol values by session made in order to identify changes in the subjects' cortisol secretion rates during the program show a general tendency for the cortisol values of all subjects to decrease, indicating that participation in the sandplay therapy program reduced the saliva cortisol secretion of all subjects with ADHD tendencies.

IV. Discussion and proposal

In the present study, the effects of sandplay therapy on university students with ADHD tendencies in terms of the subjects' depression, anxiety and saliva cortisol secretion rates that are related to stress were examined. The results obtained through the examination are summarized and discussed as follows.

First, sandplay therapy reduced the depression of university students with ADHD tendencies ($z=-2.201$, $p<.05$). These study results are consistent with the results of a study (Jang, 2010) in which it was reported that sandplay therapy applied to the depression, low self-esteem and relational problems of adults with ADHD was effective on depression, as well as the results of a study (Kang et al., 2012) in which it was reported that when sandplay therapy was implemented on parents of children who visited a child counseling center their depression was reduced. It is known that adults with ADHD tendencies frequently experience frustration, such as isolation from family members and peers in social situations like school, or frequent failures in learning situations due to their ADHD symptoms that have persisted since childhood, and as they are frequently exposed to adverse situations, they experience depression along with a decline in self-esteem (Milich & Laundau, 1982). Therefore, therapeutic intervention is necessary to enable them to perceive and deal with their symptoms, and the sandplay therapy utilized in the present study is an effective approach to relieve the depression of university students with ADHD tendencies.

Second, state-trait anxiety scale scores from before and after the implementation of sandplay therapy were compared in order to examine whether sandplay therapy relieved the anxiety of university students with ADHD tendencies. According to the results, state-trait

anxiety scores significantly decreased after the implementation of sandplay therapy ($z=-2.37$, $p<.05$). State anxiety showed changes so that the mean score (26.57) of post-tests became lower than the mean score (42.71) of pre-tests by approximately 16 points, and trait anxiety also showed changes so that the mean score (31.85) of post-tests became lower than the mean score (48) of pre-tests by approximately 16 points. ADHD adults are characterized by more prominent inattention compared to ADHD children because ADHD brings about a deficiency in their organizational abilities or time management abilities, in turn adding to their anxiety (Jang & Gwak, 2007). Therefore therapeutic intervention is necessary for ADHD adults with anxiety.

The sandplay therapy applied in the present study can be considered to have been effective in relieving their anxiety since it induced university students in early adulthood with ADHD tendencies to find the power of their inner side, deal with their emotions and connect their consciousness with their unconsciousness to gain insight into themselves. These study results are consistent with the results of a study (Kim, 2010) in which sandplay therapy that was implemented on ADHD adults relieved their anxiety, and another study (Park & Lee, 2008) in which sandplay therapy was implemented on infants who showed depression, anxiety and withdrawal behavior and proved effective on their anxiety.

Third, the mean cortisol values of all the subjects before and after all the sessions were compared and the results indicated that the mean saliva cortisol values of university students with ADHD tendencies significantly decreased after the sessions. These results demonstrated that sandplay therapy when implemented on university students with ADHD tendencies could reduce their stress levels and thus be effective in reducing hormone secretion rates. These results were consistent with the results of a study (Kim et al., 2012) which indicated that sandplay therapy was helpful in reducing the saliva cortisol values of parents of children who visited a children counseling center.

The study subjects revealed their ADHD tendencies during the process of recruitment. Although the intent of the program was sufficiently explained and they agreed to participate in it, some of the subjects did not know why they had come to the location of the program, indicating that they were inattentive. At the beginning of the program, most of the

subjects complained of diverse problems which they experienced due to their ADHD tendencies. Major complaints from almost all the young adult subjects were anxiety, depression, restlessness, and a sense of isolation resulting from failures in social relations that had been chronically repeated, and several subjects showed low self-esteem by saying that whatever they did they could not do it well and devalued themselves because of their poor academic performance in school and university. It could be determined that their stress resulted from low self-esteem caused by negative emotions such as depression and anxiety.

While the program was implemented, the subjects let go of the defensive attitudes which they had showed at the beginning of the treatment and began to deal with the problems they experienced in their daily lives. They expressed themselves in peer relationships and family relations in sand boxes in order to make their problems into images. The experience of viewing themselves in these images induced changes in their perceptions and behavior. It can be seen that through this opportunity to gain insight into themselves while dealing with the areas of consciousness and unconsciousness, the subjects' participation in the sandplay therapy program reduced their levels of depression, anxiety and stress which are secondary problems that university students in early adulthood with ADHD tendencies may suffer.

Meanwhile, since most of the study subjects were university students, their values of cortisol which is a stress hormone showed a tendency to increase a little during exam periods and when exam periods was announced, but the values generally showed a decreasing tendency. Therefore, it could be determined that sandplay therapy was effective on their emotional problems as well as changes in their hormone secretion rates. There were cases where cortisol values increased in the last session when compared to previous sessions. This can be attributable to their belief that they could not deal with their problems together with others.

The present study has a limitation in that a control group was not set for the effects of sandplay therapy on changes in the depression, anxiety and saliva cortisol secretion rates of university students with ADHD tendencies, and thus differences between the experimental group and a control group could not be checked. Furthermore, in regards to the process of collecting saliva cortisol to examine the effects of sandplay therapy on human bodies' hormone

secretion, the cortisol collection time was set to be the same and a condition was set to have the subjects wait for 30 minutes in a stable state before their cortisol was collected as a device to maintain the homeostasis of subjects participating in the experiment. However, external factors other than the treatment of the subject could not be controlled. Indeed, the subjects' cortisol values increased a little during midterm exam periods or final exam periods, assignment submission periods or presentation periods during the experiment. Several subjects also showed slight increases in cortisol values at the final session probably because of the burden of the fact that there would be no more sessions. Finally, since the present study was conducted with university students with ADHD tendencies, further studies should be conducted with adults in diverse age groups.

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