INTRODUCTION

Today’s university students in Korea have many pressures such as tuition fees, lack of job opportunities, an uncertain future after graduation, low-paying part-time jobs, getting good grades, and credit default. In the case of university students with Attention Deficit Hyperactivity Disorder (ADHD) tendencies, these tendencies turn up in the form of maladjustments in daily life because they no longer benefit from the structured academic environment that they had in high school. Some of the tendencies deteriorate into typical secondary problems, the emotional problem of anxiety, and social maladjustment that was caused by the lack of interpersonal techniques (Jang, 2004; Jang, 2010; Kim, 2009).

It is known the prevalence rate of ADHD among adults is about 2-3% when we consider that 50-60% of the children who were diagnosed as ADHD patients retain their major disorders or the symptoms that meet the general criteria for ADHD until adulthood (Barkley, 2005; Conners, Erhardt & Sparrow, 1999; Weiss & Hechtman, 1993). However, some researchers have pointed out that studies on how to measure, diagnose, and effectively treat adults’ ADHD is still insufficient, compared to that on the ADHD of children (Hope & Koski, 2005).

Adults with ADHD tendencies feel chronic anxiety and have difficulty in maintaining interpersonal relationships as they have continuously received negative feedback from their peers, family members, and teachers since childhood (Marsh & Williams, 2004). Nevertheless, previous research on adults with ADHD tendencies seldom intervened therapeutically in the problems of anxiety and interpersonal conflicts from which they suffered.

It is known that cortisol hormone levels are more effective in indicating stress levels than the self-reporting measure of stress. That is, the correlation between the cortisol hormone and stress in life, turned out to be significantly high upon being analyzed (Park & Kim, 2007).

The application of sandplay therapy, which is useful in helping university students with ADHD to handle their own emotional problems, can be considered as a suitable approach.

The purpose of this study was to investigate the effects of sandplay therapy on anxiety, interpersonal stress, and the cortisol changes of university students with Attention Deficit Hyperactivity Disorder (ADHD) tendencies. Eight university students participated in sandplay therapy for ten weeks. The data was analyzed using the Wilcoxon Signed Rank Test. This study found there were significant differences in terms of the decreases in anxiety, interpersonal stress, and salivary cortisol. It also suggests that sandplay therapy has significantly positive effects on the anxiety, interpersonal stress, and salivary cortisol levels of students with ADHD tendencies who are experiencing pressures and conflicts in university life.

Keywords Anxiety, Interpersonal Stress, Salivary Cortisol, ADHD Tendencies, Sandplay Therapy, University Students

The Effects of Sandplay Therapy on Anxiety, Interpersonal Stress, and Salivary Cortisol Levels of University Students with ADHD Tendencies

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The purpose of this study was to investigate the effects of sandplay therapy on anxiety, interpersonal stress, and the cortisol changes of university students with Attention Deficit Hyperactivity Disorder (ADHD) tendencies. Eight university students participated in sandplay therapy for ten weeks. The data was analyzed using the Wilcoxon Signed Rank Test. This study found there were significant differences in terms of the decreases in anxiety, interpersonal stress, and salivary cortisol. It also suggests that sandplay therapy has significantly positive effects on the anxiety, interpersonal stress, and salivary cortisol levels of students with ADHD tendencies who are experiencing pressures and conflicts in university life.

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Received: Apr 10, 2013 Revised: May 10, 2013 Accepted: May 30, 2013

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problems, had a positive influence on improving ADHD tendencies and on reducing depression (Kim, 2009). Furthermore, sandplay therapy had positive effects on the depression, self-esteem, and interpersonal relations of adults with ADHD tendencies (Jang, 2010), and it was effective in reducing cortisol levels (Kim et al., 2012). Thus, this study examines the influence that sandplay therapy exerts on the anxiety and interpersonal stress of ADHD university students and examines what effects that sandplay therapy has on changes in cortisol levels that assess stress neurophysiologically, as a response variable.

**Adults with ADHD Tendencies**

Attention deficit hyperactivity disorder is a typical psychological disorder in childhood that has inattention, impulsivity, and hyperactivity as its presenting symptoms (Cantwell, 1996). Initial research treated ADHD only as a childhood disorder on the assumption that the presenting symptoms of ADHD would improve as children grew older. However, longitudinal studies on ADHD children in the 1980s and early 1990s discovered that 70-80% of them stayed as patients until their adolescence and 50-60% of them grew to be adults with ADHD (Barkley, 2005; Conners et al., 1999; Weiss & Hechman, 1993). It is estimated in recent research that the prevalence rate of ADHD in adulthood would be 4.4% and 36.3% since ADHD children remain as patients even after adulthood (Kessler et al., 2005; Kessler et al., 2006). Similarly, it was reported that 30-50% of adults who were diagnosed as ADHD patients had retained the symptoms since their childhood (Barkley, 2005).

In terms of progression from childhood to adulthood, the inattentive symptoms of ADHD remain constant throughout adulthood. However, the symptoms of impulsivity and hyperactivity do decrease as children grow older and the activity pattern in adulthood settles at an appropriate level. Thus, the external behavior shows a tendency to be gradually transformed to internal conduct and their behavior problems start to be attributed to cognitive disorders (Biederman, Mick, & Faraone, 2000; Hart et al., 1995; Jang, 2004; Marsh & Williams, 2004; Willoughby, 2003).

It is hard for adults with ADHD to maintain a job as they have difficulty in maintaining concentration while working. It is commonly asserted that such inattentiveness causes them to exhibit low self-esteem and to suffer from depression and anxiety (Weiss & Hechtman, 1993) and leads to trouble in interpersonal relations (Conners et al., 1999; Weiss, 1992). Furthermore, Broun (1993) has maintained that adults with ADHD develop low self-esteem because they have failed repeatedly in daily life, met with frustration due to ADHD symptoms, and their low self-esteem leads to various emotional problems such as anxiety and depression. Thus, it was found that the typical problems of adults with ADHD tendencies appeared in the form of interpersonal problems, severe emotional problems, incompetency in learning and job performance, antisocial behavior, and anxiety.

**The Anxiety of University Students with ADHD Tendencies**

Anxiety is divided into two concepts: state and trait anxiety (Spielberg et al., 1970). State anxiety indicates the transitory emotional state of apprehension in specific situations and that trait anxiety, a personal disposition towards anxiety, is maintained through one's life with no changes. Anxiety in childhood is sometimes shown in the form of headaches or stomach aches and could be the reason for inattentiveness or distractedness in children. It is not easy to distinguish between ADHD and anxiety disorder, which coexists with ADHD, because a large portion of ADHD children (25-35% of the total number) also have anxiety disorder, and ADHD symptoms overlap with the symptoms of anxiety disorder. However, it is necessary to distinguish between ADHD and anxiety disorder as anxiety is among the side effects of ADHD medication (Kim, 2008).

The ADHD children who also have anxiety disorder tend to feel more stress and experience more difficulties in academic performance and social situations than ADHD children without anxiety disorder. As seen in the case of children, the high proportion of university students with ADHD also has anxiety disorder. Thus, 33% of anxiety disorder patients meet the diagnosis criteria for ADHD and such anxiety disorder influences negatively on the socially maladjusted behavior of ADHD adults (Conners et al., 1999).

**The Interpersonal Stress of University Students with ADHD Tendencies**

School-aged ADHD children are apt to interact negatively with peers and teachers as they try to dominate the classroom environment and interrupt class activity (Lee & Bang, 1998). In this process of interaction, the ADHD children show social withdrawal, failure to maintain smooth interpersonal relations with peers, and rejection by peers. This negative interaction is known not to be limited only to childhood but to continue through the period of university life (Barkley, 1998). It was noticed that the behavioral and emotional problems, difficulties in interpersonal relations, academic impairment, and social problems that used to exist in childhood persist into adolescence and the period of university life (Barkley et al., 1990; O'Donnell, McCann & Pluth, 2001; Bussing, Zima & Perxien, 2000).

Impulsivity is an attribute that makes one easily get angry and behave in unpredictable ways. It has been shown in research on university students with ADHD that the more serious their symptoms, the more easily they lost their temper and the more they expressed their anger in a socially intolerable way (Richards, Deffenbacher, & Rosen, 2002). Moreover, it was shown that university students with ADHD were poor at decision making and
habitually got into verbal clashes with other people. Out of all the ADHD symptoms it was impulsivity that exerts the most negative influence on interpersonal relations (Kim, 2006).

In other research, the interpersonal problems were divided into the overt, which are of an impetuous and belligerent nature, and the covert, which suppresses social relations and shows over-sensitivity in the matter of interpersonal relations. It was commented that the pattern of interpersonal problems might differ according to the symptoms of ADHD (Jang & Kwak, 2007).

**Cortisol**

It has been scientifically proven that the level of cortisol and adrenocorticotropin hormones goes up and heart rate increases when one gets stressed. Furthermore, the concentration of cortisol and catecholamine increases, the metabolic rate of norepinephrine goes up, the blood vessels expand, and flushed cheeks appear as a physical response (Jo, 2004).

It is known that the secretion of cortisol is related to the emotional variables and the concentration of cortisol in blood actually increases when we suffer severely from anxiety and depression due to stress. It is also known that the salivary cortisol is increased along with the increase of cortisol in blood because the cortisol in blood is secreted together with the steroid hormone in saliva (Go, 2001; Kim, 1998).

Anxiety causes the posterior pituitary gland to increase the secretion of antidiuretic hormone and the anterior pituitary gland to increase the secretion of adrenocorticotropin hormone, influencing the hypothalamus. The secretion of adrenocorticotropin hormone stimulates the adrenal cortex to induce the secretion of cortisol and stimulates the various glandular cells to bring about the decline of immune function (Kim, 2003; Oh, 2003).

Various approaches concerned with cortisol, including a nursing care program for children in child-care facilities (Choi, 2008), nursing intervention program for foreign workers (Park, 2009), music therapy for migrant brides (Choi, 2010), and massage therapy for the aged (Kim, 2010), were shown to reduce cortisol levels. Furthermore, it was certified that the cortisol levels of parents who visited child counseling agencies were reduced by sandplay therapy (Kim et al., 2012).

**RESEARCH METHOD**

**Research Subjects**

The present study surveyed 1,000 university students in Chungcheongnam-do in Korea randomly. Subjects who had top 10% of Conners’ ADHD rating scale were chosen first and then 48 subjects were selected as an anxiety group whose score of the State-Trait Anxiety Inventory (STAI) was ranged from 52 scores of a little high to 85 scores of extremely high. Then, subjects who belonged to top 20% in the total standard deviation of the interpersonal stress score were selected. The selected subjects were five males and five females, 10 persons in total. Except for 2 persons (one male and one female) who departed from the program due to personal circumstances in the middle of the program, eight participants were finally selected as the subjects of this study. The pre-test was conducted from May 1, to 30, 2011 and their ages were ranged from 18 to 23 years old.

**Research Instrument**

**Conners’ Adult ADHD Rating Scale-Korean version: CAARS-K**

The Korean scale that Kim and others (2005) adapted from the Conners’ Adult ADHD Rating Scale (Conners et al., 1999) was used in this study and it was composed of 66 questions. The four-point Likert scale, ranging from zero to three points, of which the validity had been verified by Conners and others (1999) through factor analysis, was composed of such factors as inattention-memory (twelve questions), hyperactivity and nervousness (nine questions), self-concept matter (twelve questions), the symptoms of inattention as per DSM-IV criteria (nine questions), the symptoms of hyperactivity and impulsivity (nine questions), and ADHD index (twelve questions). The Cronbach’s alpha of this instrument was seen to be .971.

**State-Trait Anxiety Inventory (STAI)**

The STAI that was initially developed by Spielberger (1973) and adapted later by Han and his colleagues (1993) for Koreans was used in this study. It is composed of a total of forty questions, including twenty questions to measure state anxiety. The questions on state anxiety ask how one feels in a specific situation and the questions on trait anxiety ask what trait of anxiety one is born with and the higher the score, the higher extent of anxiety is represented. The optimal cutoff point to separate into the group of normality and the group of trait anxiety, and to separate into the group of normality and the group of trait anxiety was zero point. The coefficient of Cronbach’s α for state anxiety and trait anxiety turned out to be .743 and .691 respectively.

**Interpersonal Stress Scale**

The stress scale that was developed initially by Chon and Kim (1991) and made public later by Chon and others (2000) after being newly revised was used in this study. This scale is composed of a total of ninety questions on seven domains of life stress which university students might experience. However, this study made partial use of this scale, extracting the questions on four domains concerned with interpersonal stress and the questions related to family (six questions), friends (five questions), relationships (six questions), and professors (six questions) from it. Each participant was requested to give grades to the incidents that they experienced during the past year (twelve months), us-
ing the four-point scale (zero-‘not at all’, one-‘a little’, two-‘fairly’, three-‘frequently’). They were also requested to rate the importance of the incident, in case the incident took place only once a year, using a three-point scale. The two scores on the respective scale were multiplied by each other in order to ascertain the subjective importance as well as the frequency of perceived stress. The overall Cronbach’s alpha was shown to be .940.

Cortisol Level
While measuring cortisol in plasma or urine might be stressful, measuring salivary cortisol is easy and convenient because the taking of saliva is simple and not invasive and we can take saliva at any time we want. Research subjects who gargled with clean water after fifteen minutes stay in the waiting room were ordered to take the cotton balls for measuring salivary cortisol from a container into their mouths, without touching them by hand, chew them for one minute to make their salivary cortisol permeate the cotton ball, and then put them back into the container without touching them by hand. Afterward, those containers with chewed cotton balls were immediately put into a freezer for storage. Subsequently, all of the frozen containers were sent to a laboratory for clinical analysis.

Research Design and Procedures
This research was conducted using the one-group pretest-posttest design in order to verify the effects of sandplay therapy on the anxiety, interpersonal stress, and cortisol levels of university students with ADHD tendencies. The individual sandplay therapy session was implemented once a week for ten weeks, allotting each subject a 45 minute session per week, with three therapists conducting the individual therapy. The self-reporting ADHD rating scale, anxiety scale, and interpersonal stress scale were implemented both before and after sandplay therapy and the salivary cortisol was also taken every other week (the 1st, 3rd, 5th, 7th, and 10th weeks) both before and after each therapy session.

The sandplay therapy was commenced only after prior consent regarding the contents of the program was obtained from each subject. The sandplay therapy was unstructured, so the program progressed in a non-directed way in which the clients had the freedom to create their sand trays with no specified theme and the therapists were present just to observe how the clients expressed themselves.

Data Collection and Analysis Method
In order to examine the effects of sandplay therapy on the anxiety, interpersonal stress, and cortisol levels of university students with ADHD tendencies, the ADHD scale, anxiety scale, and interpersonal stress scale were implemented both before and after sandplay therapy and the salivary cortisol was also taken every other week (the 1st, 3rd, 5th, 7th, and 10th weeks) both before and after each therapy session. The trend of cortisol hormone was also measured every other week both before and after the sandplay therapy session. The Wilcoxon Rank Sum Test, a non-parametric method, was executed to examine the differences between ex-ante and ex-post numerics with sandplay therapy.

RESEARCH RESULTS

The Effects of Sandplay Therapy on the Anxiety of University Students with ADHD Tendencies
In order to examine the effects of sandplay therapy on the state anxiety of subjects, the pre and post-test of State Anxiety were implemented and the results as presented in Table 1, Figure 1 were acquired upon conducting the Wilcoxon Rank Sum-Test. From this result regarding state anxiety, it was noticed that the mean value of pre-test (27.25) decreased by 14.87, compared to that of post-test (42.12), and there was a significant difference ($z = -2.52$, $p < .05$) between them. Hence it can be said that sandplay therapy is effective in reducing the state anxiety of university students with ADHD tendencies.

The results of Trait Anxiety test are presented in Table 2. For trait anxiety, the mean value significantly decreased in post-test ($z = -2.52$, $p < .05$). Accordingly, it is concluded that sandplay therapy is effective in reducing the trait anxiety of university students with ADHD tendencies.

The Effects of Sandplay Therapy on Interpersonal Stress of University Students with ADHD Tendencies
The results of pre and post-tests of interpersonal stress were presented in Table 2, Figure 2. It was observed in this result that the

Table 1. Pre-post test scores of state-trait anxiety

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre M</th>
<th>SD</th>
<th>Post M</th>
<th>SD</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stat-Anxiety</td>
<td>42.12</td>
<td>4.76</td>
<td>27.25</td>
<td>9.70</td>
<td>-2.52**</td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>47.37</td>
<td>5.31</td>
<td>32.12</td>
<td>7.21</td>
<td>-2.52**</td>
</tr>
</tbody>
</table>

**$p < .01$.  

Figure 1. Each subject’s pre-post test scores of state-trait anxiety.
The Effects of Sandplay Therapy on Anxiety, Interpersonal Stress, and Salivary Cortisol Levels

The mean value of the pre-test (33.14) decreased significantly after the sandplay therapy program in the post-test ($z = -2.36, p < .05$). Hence, it can be assumed that sandplay therapy is effective in reducing the interpersonal stress of university students with ADHD tendencies.

The Effects of Sandplay Therapy on Cortisol of University Students with ADHD Tendencies

The cortisol levels were also significantly decreased as presented in Table 3, Figure 3. Thus, it can be concluded that sandplay therapy was effective in reducing the cortisol levels of university students with ADHD tendencies.

DISCUSSION AND CONCLUSION

First, having compared the anxiety score before sandplay therapy with that after sandplay therapy in order to check whether the sandplay therapy was effective in reducing the state anxiety of university students with ADHD tendencies, it was observed that there was a significant statistical difference between pre and post-test scores. The trait-anxiety also had shown a significant statistical decrease. That is to say, sandplay therapy brought about a significant statistical reduction both in the state anxiety and trait anxiety of university students with ADHD tendencies.

Second, it was observed that sandplay therapy was effective in reducing the interpersonal stress of university students with ADHD tendencies. From this, it is concluded that sandplay therapy is effective in reducing the interpersonal stress of university students with ADHD tendencies.

There have been some reports that adolescents or university students with ADHD tendencies have trouble in interpersonal relations (Barkley et al., 1990) due to their aggressive impulsivity, negative feedback, as well as incapability in decision making (Kim, 2006). Therefore, sandplay therapy can give them ‘the protected free space’ to express safely their negative feelings related to their low self-esteem and low self-control.

Third, it was noticed that there was a remarkable decrease between the cortisol levels, showing a significant statistical difference. It seems that the reduction of cortisol hormones took place in line with the fact that the anxiety and interpersonal stress of university students diminished through sandplay therapy. Furthermore, it was observed that the positive effects of cortisol reduction could be gained in the process whereby they express and create their inner world (Kim, 2009; Lee, 2011). From this result, it was determined that the positive intervention of sandplay therapy could reduce the cortisol levels and this result also coincides with the research by Kim and colleagues (2012). They found that sandplay therapy had a clear positive influence on the stress, coping style, and cortisol levels of parents who visited counseling agencies.

This study demonstrated that sandplay therapy can reduce cortisol levels, the anxiety, and interpersonal stress of university students with ADHD tendencies, which coincides with the studies that maintain that the cortisol measurement is more effective in indicating stress level than the self-reporting stress scale. Putting together the results of this research, it was observed that university students with ADHD tendencies suffered from anxiety and interpersonal stress which could be reduced through sandplay therapy. This study is meaningful in that it ascertained objectively the change in cortisol hormones to complement the limit of the self-reporting assessment tool, and measured the salivary cortisol of university students with ADHD tendencies.
through sandplay therapy, while most of the previous studies on sandplay therapy had focused mainly on case studies. That is, this study has verified that sandplay therapy is effective in reducing both anxiety and interpersonal stress through the attempt to measure the cognitive/emotional aspects of anxiety and interpersonal stress, analyzing the cortisol physiologically.

In order for the university students with ADHD tendency to complete their study with less anxiety and to adapt themselves in their interpersonal relationships they need some intervention.

REFERENCES


