The Comparative Study of Depression between Gifted Children and Normal Children

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Background: *Gifted children have more depression than normal children because of their expectation to be the first.*
Objective: *Compare depression between gifted children and normal children.*
Material and Method*: The subjects, aged 9-12 years from Patai School, were 40 gifted children and 40 normal children. Their depression conditions were evaluated by using CDI score and taking saliva sample for cortisol measurement.*
Results: *The prevalence of depression by CDI score in 40 gifted children was 37.5% and the prevalence of depression by CDI score in normal children was 27.5%. The data was analysed by Chi-square test and the result was not statistical significant ($p > 0.05$). The mean salivary cortisol level in 39 gifted children was 4.91 nmol/l (SD = 2.12) and the average salivary cortisol level in 38 normal children was 4.14 nmol/l (SD = 1.92). The data was analysed by unpaired t-test and the result was not statistical significant ($p > 0.05$). There was no correlation between salivary cortisol and CDI score ($r = -0.194$)*
Conclusion*: Gifted children do not have more depression than normal children. However, a larger sample size should be considered in the future study.*

Keywords*: Depression, Gifted children, Cortisol, Children's Depression Inventory, CDI*

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Under stressful situation, the hypothalamopituitary-adrenocortical (HPA) axis is activated[1]. Corticotropin releasing hormone (CRH) from hypothalamus stimulates anterior portion of pituitary gland to release adrenocorticotropic hormone (ACTH). In turn, ACTH stimulates the secretion of cortsol from the adrenal cortex. The other stress response is the sympathetic activation, resulting in an increase of noradrenalin release[2]. Most researches found that the function of hippocampus was interfered with the rise in cortisol[3]. Hippocampus is responsible for learning new things and memory[4]. Decreased memory is associated to increased cortisol[5].

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An animal study shows that stressed rat pups, separated from their mother for 3 hours, have abnormal behaviours, phobia, and decreased curiosity[6]. In 2000, Lemaire and colleagues reported that rats, born from stressed mothers, have an increase of cells in the hippocampal dentate gyrus less than control group 45%, producing learning deficits[7]. It was also found that stressed rats, induced by footshock, have a decrease in BDNF mRNA in the hippocampal dentate gyrus[8]. A human study found that children with posttraumatic stress disorder had higher cortisol and epinephrine levels in 12 hour urine than the control group[9]. The hippocampal size is decreased in the soldiers who worked in the war[10].

Gifted children are the children who show enhanced competency in special areas (*e.g.* language, leadership, art, music, sport, mathematic and science)

more than normal children in the same age and the same environment[11]. Many studies have shown that gifted children trend to have behavioural or emotional problems due to many causes, including unrealistic expectations of parents and teachers, parent over-involvement, difficulties with peer groups chronic stress in children can increase the sensitivity of HPA to stress as well as affect the mind and body in later life[12]. Besides, longterm stress is closely correlated to various psychiatric disorders including anxiety and depression[13]. If depression in gifted children progressively increases without solving, these would cause many problems for individual, their family, the society and the country in the future. Therefore, the investigation of depression in gifted children will be useful to be aware of its effect on memory, emotion and behaviour[14].

Aims of this study were to compare depression between gifted children and normal children by assessing Children Depression Inventory (CDI) and measuring saliva cortisol. Association between cortisol level and depression in gifted children and normal children was also investigated.

Material and Method

Study design and participants

Forty gifted children aged between 9-12 years (Mean $\pm$ SD = 10.80 $\pm$ 1.02) diagnosed according to the Patai's specific process and forty normal children aged between 9-12 (Mean $\pm$ SD = 10.85 $\pm$ 0.94) were recruited for this study after having given informed consent. The inclusion criteria were those 1) who did not have psychiatric disease 2) are not afraid of taking saliva sample and 3) have no history of endocrine disorder. This study was approved by Human Ethics Committee of Srinakharinwirot University, which is in compliance with the international Guiding Principles for Biomedical Research Involving Human provided by the National Research Council of Thailand. The experimental groups consisted of gifted in English (5 boys and 5 girls), Thai (5 boys and 5 girls), science (5 boys and 5 girls), mathematics (7 boys and 3 girls). Normal children from Patai School were recruited as a control group matched with the gifted children for age and sex.

The Patai 's specific process is the children took Dr.Aausanee's ability test, were observed in exploring center (It consists of many area such as science and mathematic) where they have chance to select up to their preference, the final exam marks were also considered to select gifted children. The parent were interviewed to determine ability of the children, the committee of gifted children then evaluated the result and determined which children were gifted.

CDI (Children Depression Inventory)

All subjects were assessed in their depression using CDI (Children Depression Inventory). This questionnaire was developed from Beck Depression Inventory, Maria Kovacs by Umaporn Trangkasombat. This test consists of 27 items concerning depression in many aspects. Each item consists of 3 choices involving the severity of depression in two weeks (0 = no, 1 = often and 2 = always). The total score is 0-52. From the research, we found that Thai CDI can discriminate normal children from depressive children with significance at $p < 10^6$. In Thai version, the reliability coefficient (Alpha) is 0.83 and discriminate validity higher than receiver operation characteristic curve and 16 or more is the point for depression. At this point, Thai CDI has a sensitivity of 78.7%, a specificity of 91.3% and accuracy of 87%.

Saliva cortisol determination

Instructions were given to children's parents prior to the experiment day. Two hours before saliva collecting, the subjects were informed to avoid eating food and drinking beverages, especially, acidic beverage since low pH value will interfere with immunoassay. The saliva sample was collected at 8:00 am after cleaning the mouth with drinking water. Then, the saliva sample was obtained by placing sterile cotton under the tongue without chewing for 3 min. All samples were centrifuged at 2,400 g for 5 min and saliva supernatant was then stored at -20°C until using electrochemiluminescense

Statistical analysis

Comparison of the salivary cortisol between gifted children and normal children was analysed by unpaired t-test. The difference of the CDI score between gifted children and normal children was analysed using Chi-square test. Value were considered to be significantly different when $p < 0.05$. The association between salivary cortisol level and CDI score both in gifted children and normal children was analysed by Pearson correlation test.

Results

Subject characteristics

The demographic data of subjects in gifted children and normal children are shown in Table 1. There are no statistical significant different of demographic background in two groups.

Table 1. Demographic data of gifted children and normal children

Factor	Gifted children (n = 40)	Normal children (n = 40)
Gender		
Male	22 (55%)	25 (62.5%)
Female	18 (45%)	15 (37.5%)
Age	10.80 ± 1.02	10.85 ± 0.94
Parent Status		
Couple	39 (97.55)	38 (95%)
Divorced	1 (2.5%)	2 (5.0%)
Stressor in one month		
No	8 (20.0%)	8 (20.0%)
Yes	32 (80.0%)	32 (80.0%)
Underlying disease		
No	23 (57.5%)	25 (62.5%)
Yes	17 (42.5%)	15 (37.5%)

Psychological assessment

Both gifted children and normal children had completed CDI test 100%. The mean CDI score of gifted children and normal children were 13.50 ± 3.30 and 13 ± 1.30, respectively (Fig. 1). There were 11 depressive children in 40 normal children who had the CDI score 16 or more equal to 27.5%. There were 15 depressive children in 40 gifted children equal to 37.5%. This showed that depression in gifted children trended to be higher than in normal children but it was not statistical significant ($p > 0.05$).

Salivary cortisol assessment

The mean salivary cortisol in normal children was 4.14 nmol/l (SD = 1.92) and the mean salivary cortisol level in gifted children was 4.91 nmol/l (SD = 2.12). The mean salivary cortisol level in gifted children was higher than normal children but it was not statistical significant by unpaired t test ($p > 0.05$).

The relationship between CDI score and salivary cortisol

The relationship between CDI score and salivary cortisol both in gifted children and normal children was tested by Pearson correlation test. There were inverse and no correlation between CDI score and salivary cortisol level ($r = -0.194$). The distribution of each subjects are shown in Fig 3. However, the distribution of cortisol level in most gifted children was higher than normal children.

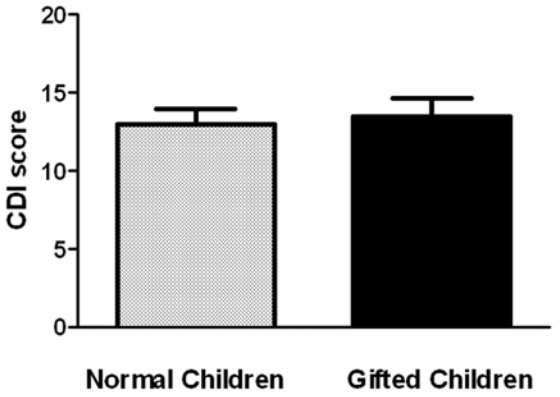

Fig. 1 Comparison of CDI score between normal children and gifted children

Fig. 2 Comparison of salivary cortisol between normal children and gifted children

Discussion

This research found that 37.5% of the gifted children had depression compared to 27.5% in normal children. This result is consisted with the previous results showing that gifted children had more depression than normal children[11,15]. The reason was that gifted children have different ideas from other children, have conflicts, are isolated, because of their eccentric behaviour snobbish physically meek[16]. The society had expected that gifted children had more ability than normal children such as creating new things. Parents, teachers and friends often expect the best knowledge from gifted children therefore they believe that their parents or teachers took advantage from their knowledge for success in their lives or works[17]. However, Chi-square test was not statistically significant[18] ($p > 0.05$) because the sample group was small. Therefore, a

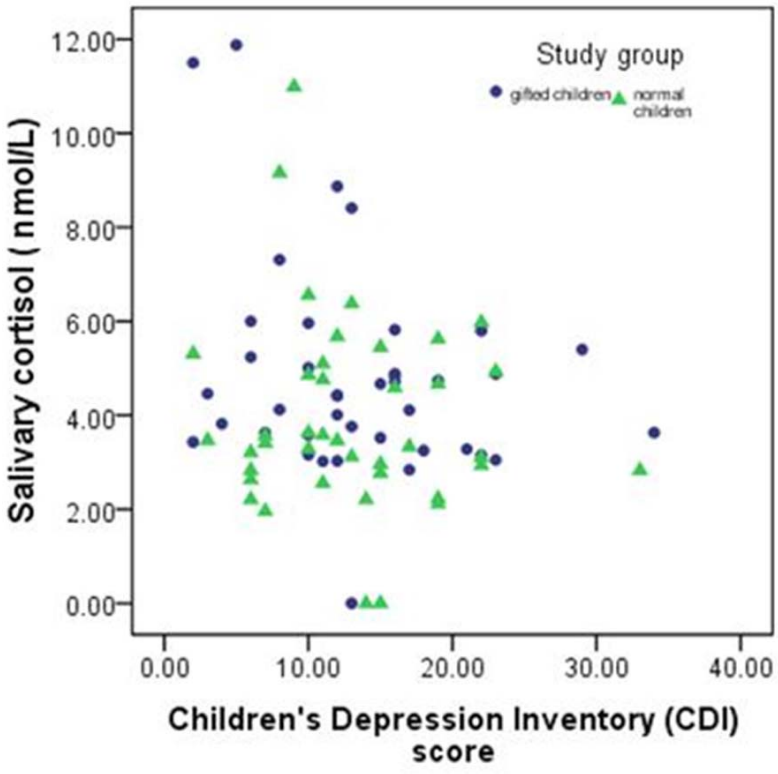

Fig.3 The relationship between CDI score and salivary cortisol in gifted children and normal children

larger sample should be used in future research.

This research found that salivary cortisol level in gifted children seemed to be higher than normal children. This might show that gifted children are more depressive and stressful than normal children[19].It could be argued that demographic data affected salivary cortisol both in gifted children and normal children but there were no statistical significant different dermographic background in two group. However unpaired t-test was not statistical significant ($p > 0.05$). A larger number of gifted children need to be investigated.

There was no association between salivary cortisol levels and CDI score both in gifted children and normal children. The present result was compatible with several previous researches. For example, in 1996 Van Eck reported that the stressors that had terminated, showed an attenuated cortisol response compared to those stressor still on going. The adrenocotical response may have attenuated to the point where it was no longer detectable[20]. Depression by Thai CDI sore was depression within two weeks that was not severe enough to affect the salivary cortisol levels. Awakening and noon cortisol were not associated with CDI score. The evening cortisol was more associated[21]. There were individual differences in cortisol reactivity[22,23].

The present research was incompatible with the previous research, in 2003 Marita Pruessner studied the association of self-reported depression with early morning free cortisol levels in forty healthy male university students aged 18-35 (mean age 24.5 ± 4.33). They assessed the severity of depressive symptom using the Hamilton Depression Inventory once a week for 4 weeks, The subjects provided salivary samples, collected at 0, 30, 60 min after awakening. It found that higher level of depression was associated with a greater cortisol response after awakening[24].

Conclusion

The present research has illustrated depression in gifted children in comparison with normal children, salivary cortisol level in gifted children in comparison with normal children and the association between salivary cortisol and CDI score both in gifted children and normal children. There were no significant difference in depression and salivary cortisol level

between gifted children and normal children and there was no association between CDI score and salivary cortisol both in gifted children and normal children. Finally, the quality and appropriateness of rearing gifted children should be the interesting subject to prevent stress and depression.

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การศึกษาเปรียบเทียบภาวะซึมเศร้าของเด็กอัจฉริยะและเด็กปกติ

วันเพ็ญ ธุรกิตต์วัณณการ, สมฤดี สายหยุดทอง, สุรางค์รัตน์ ศรีสุรภานนท์, อุษณีย์ อนุรุทธวงศ์

***ภูมิหลัง**: เด็กอัจฉริยะมีภาวะซึมเศร้ามากกว่าเด็กปกติเพราะความคาดหวังเป็นที่หนึ่ง*
***วัตถุประสงค์**: เพื่อเปรียบเทียบภาวะซึมเศร้าระหว่างเด็กอัจฉริยะและเด็กปกติ*
***วัสดุและวิธีการ**: กลุ่มตัวอย่างเป็นเด็กอัจฉริยะ 40 คน อายุ 9 -12 ปี จากโรงเรียนไผท และเด็กปกติ 40 คนอายุ 9-12 ปี จากโรงเรียนไผทประเมินภาวะซึมเศร้าโดยให้ทำแบบทดสอบภาวะซึมเศร้า CDI และเก็บน้ำลายเพื่อวัดระดับคอร์ติซอล*
***ผลการศึกษา**: พบภาวะซึมเศร้าในเด็กอัจฉริยะ 37.5 % และพบภาวะซึมเศร้าในเด็กปกติ 27.5 % วิเคราะห์ค่าทางสถิติด้วยวิธี Chi-square ไม่พบว่ามีความแตกต่างอย่างมีนัยสำคัญทางสถิติ (p > 0.05) ระดับคอร์ติซอลในน้ำลายโดยเฉลี่ยของเด็กอัจฉริยะ 39 คน เท่ากับ 4.91 nmo l/l (SD = 2.12) และระดับคอร์ติซอลในน้ำลายโดยเฉลี่ยของเด็กปกติ 38 คน เท่ากับ 4.14 nmo l/l (SD = 1.92) วิเคราะห์ค่าทางสถิติด้วย unpaired t-test ผลไม่มีนัยสำคัญทางสถิติ (p > 0.05) ไม่มีความสัมพันธ์ระหว่างระดับคอร์ติซอลในน้ำลาย และคะแนน CDI (r = -0.194)*
***สรุป**: เด็กอัจฉริยะไม่มีภาวะซึมเศร้ามากกว่าเด็กปกติ แต่ควรมีการศึกษาโดยใช้จำนวนประชากรที่มากกว่านี้*