Original Article

A study of the correlation between BSID-III and KICDT for children with developmental delay

Hun-ju Kim[1], Joong-il Shin[2]*

[1) Department of Occupational Therapy, Dongju College, Republic of Korea
[2) Department of Occupational Therapy, Honam University: 417 Eodeung-daero, Gwangsan-gu,
 Gwangju 506-714, Republic of Korea

Abstract. [Purpose] The aim of the present study was to evaluate the usefulness of the BSID-III through the comparison of results from the BSID-III and KICDT and analyzing the correlation for each item. [Subjects] The subjects of the study were 27 children diagnosed with delayed development who had visited a pediatric rehabilitation care facility between January 2012 and October 2013. They are younger than 42 months of age. Other children with a congenital lesion or other conditions revealed by brain CT or MRI were excluded. [Results] The cognitive and fine motor categories among the lower categories of the BSID-III demonstrated strong correlations with the lower categories of the KICDT; however, the social-emotional category did not show any correlation. As a result, the BSID-III may be a useful testing tool for screening or for identification of developmental stages in children with delayed development. [Conclusion] Studies with various groups and ages should be done in the future, and there should be the Korean standards for the BSID-III.
Key words: Bayley scale of infant development-III, Korean infant and child development test, Developmental delay

INTRODUCTION

It is not known what exactly causes delayed development. Mostly the development of cognition, language, fine and gross motor skills, social skills and daily life seems to be delayed, as they should be developed before the age of 18[1, 2]. These developmental delays include high-risk infants, cerebral palsy, learning disabilities, mental retardation, and congenital muscular diseases. Cerebral palsy and mental retardation are majority among them[3]. Developmental delays are characterized by a with delayed functional development process compared with that in normal children; however, the degree of developmental delay can be regulated or causes of delayed development can be treated when detected early. Early identification and mediation of developmental delay can minimize the issues afterwards with long-term function enhancement[4]. According to Wolff[5], the aftereffects of disabilities in of children with developmental delays can be minimized through the early evaluation, accurate diagnosis and early interventions. Therefore, it is very important to provide proper interventions through screening by early evaluation for the children with a potential risk of disability. There is a great demand for a tool to determine the potential risks or problems in the early stage of developmental delay. However, there is only limited number of comprehensive

and objective tools for evaluation and diagnosis[6].

The KICDT (Korean infant and child development test) developed by the Development Evaluation Enacting Subcommittee of the Korea Pediatrics Academy in February 2002 is a scaled development test for toddlers under the age of five and classifies five lower categories to determine development accordingly to a development index, which can be utilized to screen toddlers who are suspected of having delayed development in a comparatively short amount of time or to observe toddlers who already received treatment in follow-up.

The BSID-III is also very useful as a periodic evaluation tool for measuring the maturity of the central nervous system, particularly in the evaluation of intelligence and motor development of very small infants or premature infants as well as in the evaluation of premature infants if they are developing normally. The level of functional development in the children are evaluated and compared against those of normal children to determine the degree of development. Measurements in the five categories of cognition, language, motor skills, social emotions, and adaptive behavior are provided in a numerical index. Its advantages included that the evaluator interacts with the child directly in a structured environment and that can be done with an infant right after the birth. The common BSID-II has been modified as an evaluation tool for functional development of children from 16 days after birth to the age of 42 months to improve the quality and usefulness of evaluations[7]. However, this tool is not utilized widely by institutions, and since not many studies have been done in Korean children, how effective it is unknown.

Therefore, the BSID-III and KICDT were compared and

*Corresponding author. Joong-il Shin (E-mail: kanunu@ hanmail.net)

analyzed in the present study to identify the usefulness of the BSID-III in Republic of Korea.

SUBJECTS AND METHODS

The subjects of the study were 27 children diagnosed with delayed development who had visited a pediatric rehabilitation care facility between January 2012 and October 2013. They are younger than 42 months of age. Other children with a congenital lesion or other diagnosis by brain CT or MRI were excluded. The BSID-III and KICDT were administered individually by an occupational therapist, taking approximately 50 minutes, and then the children receives a treatment from a pediatric rehabilitation medicine physician. The occupational therapist identified the medical history of the subjects. The data were processed by SPSS 19.0 in the correlation analysis. Pearson's correlation was used for statistical analyses of the correlation between the BSID-III and KICDT. All the parents understood the purpose of this study and provided their written informed consent prior to participation in the study in accordance with the ethical principles of the Declaration of Helsinki.

RESULTS

The characteristics of the research subjects are shown in Table 1. Their general characteristics were as follows: 19 boys (70.4%) and 8 girls (29.6%); 11 children between the age of 13 and 24 months (40.7), 10 children between the age of 25 and 36 months (37.1%), and 6 children between the age of 37 and 48 months (22.2%); 14 children born by C-section (51.9%) and 13 children born by induced labor (48.1%); an average gestation period is 39.96±1.05 weeks, mostly distributed between 38 and 41 weeks; and an average weight at birth of 3.44±0.43 kg, mostly distributed between 2.80 kg and 4.08 kg. The correlations of the lower categories of the BSID-III were as the follows. Each lower category demon-

strated significant correlation within a significance level of $p < 0.01$ (Table 2). The correlations between the BSID-III and KICDT were as follows. In the cognitive category of the BSID-III, the correlation for the fine motor and social personal areas in the Korean infant development evaluation shows the significance level of $p < 0.01$, while $p < 0.05$ was observed for other correlations. In the receptive communication area, the significance level for the social personal areas of the KICDT was $p < 0.01$, while $p < 0.05$ was observed for the language area. In the expressive communication area, the correlation showed a significance level of $p < 0.05$ in both language and cognitive areas of the KICDT. In the fine motor area, the correlation showed a significance level of $p < 0.05$ in the language and cognitive areas of the KICDT while $p < 0.01$ was observed in the other areas. For the gross motor area, significant correlation ($p < 0.05$) was only found in the gross motor area of the KICDT. In the social-emotional area, there was no correlation with any area in the KICDT. The cognitive and fine motor areas of the lower categories of the BSID-III demonstrated high correlation with the lower categories of the KICDT, and the social-emotional area did not show any correlation (Table 3).

Table 1. General characteristics of the survey participants

Category		Frequencies	%
Gender	Male	19	70.4
	Female	8	29.6
Age	13–24 months	11	40.7
	25–36 months	10	37.1
	37–48 months	6	22.2
Delivery	Cesarean	14	51.9
	Normal	13	48.1
Pregnancy week number (months)		39.96±1.05	
Birth weight (kg)		3.44±0.43	

Table 2. Correlation analysis of the BSID-III subtest

	Cognitive	Receptive communication	Expressive communication	Fine motor	Gross motor
Receptive communication	0.801**				
Expressive communication	0.756**	0.850**			
Fine motor	0.979**	0.851**	0.747**		
Gross motor	0.836**	0.770**	0.653**	0.827**	
Social emotional	0.584**	0.751**	0.549**	0.669**	0.697**

Table 3. Correlation analysis of the BSID-III subtest and KICDT

	Gross motor	Fine motor	Social personal	Language	Cognitive
Cognitive	0.408**	0.602**	0.660**	0.450*	0.381*
Receptive communication	0.340	0.385	0.498**	0.389*	0.298
Expressive communication	−0.508	0.174	0.277	0.439**	0.397*
Fine motor	0.535**	0.634**	0.678**	0.422*	0.407*
Gross motor	0.394*	0.284	0.307	0.024	0.040
Social emotional	0.364	0.026	0.114	−0.076	0.024

DISCUSSION

There have been many studies conducted domestically of the BSID-II. Jae[8] and Chung et al.[9] explored evaluation scale and studies of the validity of Bayley Scales of Infant Development in Korean infants, and Cho et al.[10] established the standard for the KBSID-II through prior study of the standardization of KBSID-II by Park et al.[6] and others. Standardization of the BSID-III is under way in the Republic of Korea but it remains insignificant. Studies on reliability for children with developmental delays are also very scarce. In determining the correlations of the lower categories of the BSID-III for children with developmental delays, correlation with the significance level of $p < 0.01$ was found among the lower categories. In the correlation analysis for the BSID-III and KICDT, the cognitive area of the BSID-III showed a significant correlation with every area of KICDT. In the receptive communication area, there was a significant correlation only in the social personal and language areas of the KICDT. In the expressive communication area, there was a high correlation with language and cognitive areas. In the fine motor area, there was a significant correlation with every area of the KICDT. In the gross motor area, there was a significant correlation only with the gross motor area of the KICDT. In the social-emotional area, there was no correlation with every area of the KICDT. The cognitive and fine motor areas of the BSID-III showed high significant correlation with the cognitive and fine motor areas of the lower categories of the KICDT, but there were no correlations with the social-emotional area. There were significant correlations for many areas of the BSID-III, and this indicates that it could be a useful evaluation tool in identifying the degree of development in each area or screening of children with developmental delays. If children are evaluated and observed repeatedly rather than just once, the evaluation result will be more accurate, which should make up for the shortcoming of the BSID-III. The BSID-III was found to be a valid and useful evaluation tool for determining development stages or screening children with developmental delays. Further studies on diverse groups and ages are needed.

REFERENCES

1) Peterson NL, Graetz J, Niebergall S, et al.: Are states defining their target populations of 0~2 and 3~5 year old children for early intervention services? Washington DC: The Council for Exceptional Children/Division of Early Childhood, 1987.

2) Shevell M, Ashwal S, Donley D, et al. Quality Standards Subcommittee of the American Academy of Neurology Practice Committee of the Child Neurology Society: Practice parameter: evaluation of the child with global developmental delay. Neurology, 2003, 60: 367–380. [Medline] [CrossRef]

3) Msall ME, DiGaudio KM, Duffy LC: Use of functional assessment in children with developmental disabilities. Phys Med Rehabil N Am, 1993, 4: 517–527.

4) Lee EJ, Hwangbo K, Oh TY, et al.: Comparison of motor development of preterm and full term infants. J Phys Ther Sci, 2011, 23: 745–748. [CrossRef]

5) Wolff PH: Discontinuous changes in human wakefulness around the end of the second month of life: lessons from the blind. Dev Med Child Neurol, 2002, 43: 198–201.

6) Park HW, Cho BH, Choi HJ: Standardization of Korean Bayley Scales of infant development: preliminary studies. Korean J Psychol, 2003, 16: 121–134.

7) Bayley N: Bayley Scale of Infant and Toddler Development, 3rd ed. San Antonio: Harcourt Assessment, 2006.

8) Jae KS: A study for the scaling of the Bayley scales of infant development for Korean infants. Korean J Child Stud, 1984, 5: 53–64.

9) Chung MJ, Rhee UH, Park KJ: A preliminary study for the standardization of the Bayley scales of infant development for Korean infants. Korean J Child Stud, 1993, 14: 5–21.

10) Cho BH, Park HW: The standardization study of Korean Bayley Scales of infant development (K-BSID-II): analyses of Korean infants performance of K-BSID-II in terms of demographic variables. Korean J Dev Psychol, 2004, 17: 191–20.