Concurrent Validity of the Ages & Stages Questionnaires, Third Edition, Thai-Version (ASQ-3 Thai) with the Denver Developmental Screening Test II (DDST-II) in Developmental Screening of 18, 24, and 30 Months Old Children at Queen Sirikit National Institute of Child Health

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Objective: *To determine the concurrent validity of the Ages & Stages Questionnaires, Third Edition, Thai-version (ASQ-3 Thai) with the Denver Developmental Screening Test II (DDST-II) and agreement between them in developmental status screening in toddlers.*
Material and Method: *Children at the ages of 18, 24, and 30 months were enrolled. Each age group included 15 normal and 15 suspected cases. Participants were developmentally assessed by the DDST-II performed by a developmental pediatrician (BS). Parents of the enrolled children simultaneously completed their toddler's age-specific version of the ASQ-3 Thai questionnaire. Concurrent validity of the ASQ-3 Thai with DDST-II was determined by descriptive statistics using the cross tabulation technique. Kappa analysis was used to calculate agreement between the ASQ-3 Thai and DDST-II.*
Results: *A fair to moderate agreement (Kappa agreement = 0.338-0.606) was found between the ASQ-3 Thai and the DDST-II. Sensitivity of the ASQ-3 Thai with DDST-II at the age of 18, 24, and 30 months were 66.7%, 88.2%, and 54.5%, respectively. Specificity of the tool when compared to the DDST-II were 78.6%, 71.4% and 90.9%, respectively.*
Conclusion: *This was a preliminary study of the ASQ-3 Thai version for developmental screening in clinical setting. Due to a fair to moderate agreement but low sensitivity between the ASQ-3 Thai and DDST-II, other validated tools should accompany the clinical usage of the tool. Further investigations are needed to support its usage, particularly the validation of the tool with other standardized developmental diagnostic tools.*

Keywords: *ASQ-3 Thai, DDST-II, Developmental screening*

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Developmental delay is a crucial problem in pediatric health care. Pediatric health care professionals and caregivers should understand the child's developmental processes and patterns to be able to promote proper development and implement effective interventions to help the child's achieve their highest developmental potential[1]. Developmental assessment can be made through appropriate surveillances and screenings. The application of a standardized screening tool into the routine developmental assessment can help in early detection of children at risk for delays.

Generally, developmental screening tests should be reliable and valid enough to detect a deviation from normal trajectory[2-4]. Broad-based developmental screening tests, which are recommended for developmental screening in young children should include four developmental assessment domains including fine and gross motor skills, language and

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communication, problem solving/adaptive behavior, and personal-social skills[2]. Currently, there is no ideal standardized developmental screening test, which is appropriate for developmental screening in all populations. Tests with moderate sensitivity and specificity at 0.7-0.8 are accepted for developmental screening[2] sing in all population ed scel for concerned developmental problem child.

In Thailand, Denver Developmental Screening Test II (DDST-II) is widely used as a broad developmental screening tool due to its good psychometric properties. DDST-II has a good reliability of 0.99±0.016 with sensitivity and specificity of 0.56-0.8 and 0.43-0.80, respectively[2,5]. However, not only does the DDST-II needs a trained personal to be able to use the tool properly, it also takes about 10-20 minutes to apply[2]. These factors can thus limit the use of this screening tool in a busy pediatric outpatient clinic.

Ages & Stages Questionnaires, Third edition (ASQ-3) is a parent-completed questionnaire that is widely used in the United State of America. With its good reliability, the ASQ-3 has been translated and modified into several languages and are being used across the world. The questions are organized into five areas of developmental function: communication, fine motor, gross motor, problem solving, and personal-social, with sensitivity and specificity of 0.70-0.90 and 0.76-0.91 respectively[2,6,7]. Furthermore, the uniqueness and advantage of the ASQ-3 over other developmental screening tools is that it can be used as a home-based parental educational material to monitor their children's developmental milestones and promote healthy progression.

The ASQ-3 Thai had been translated and culturally modified by Dr. Prasong Saihong, Faculty of Education Mahasarakham University, Thailand. In 2009, the reliability and feasibility of the tool in early child care setting had been studied by Dr. Saihong in the northeastern part of Thailand[8]. The moderate to good internal consistency (Cronbach's coefficient alpha 0.58-0.89), strong test-retest reliability (percentage agreements >90%) and fairly high inter-observer reliability (Pearson's coefficients correlation 0.76-0.86) were reported from the study[8]. The present study showed that the ASQ-3 thai version has a good psychometric property and can be used as a reliable developmental screening tool in Thai children, particularly in child care setting. However, the ASQ-3 Thai has not been validated in any other setting particularly in a pediatric or developmental clinic which may have a higher prevalence of the developmental delays yet. Hence, the use of the tool in routine clinical practice is still very limited despite having many advantages over the other existing screening tools.

With its limiting data in clinical practice usage, another study was required to determine the concurrent validity of the tool including the agreement, sensitivity and specificity of the tool with the previously standardized screening tool that has been widely used in pediatric clinical practice in Thailand: the DDST-II.

Material and Method

Developmental screening tests

DDST-II is a developmental screening tool that includes 125 items of four screening areas. All items are categorized into 25 personal social items, 29 fine motor-adaptive items, 39 language items and 32 gross motor items. The tool can be used periodically from newborn period until at 6 years of age and for subsequent developmental follow-up. In each screening session, the items are progressively conducted until the child failed to respond appropriately in 3 consecutive items of each domain. Individual items are interpreted as "advanced", "normal", "caution" or "no opportunity". The "suspected delay development" will be assigned if a child receives at least 2 "caution" items and/or 1 "delay" item in any domain.

The ASQ-3 Thai consists of five developmental screening domains including communication, gross motor, fine motor, problem solving, and personal-social. There are 21 aged-specific version questionnaires that are designed to administer at 2, 4, 6, 8, 9, 10, 12, 14, 16, 18, 20, 22, 24, 27, 30, 33, 36, 42, 48, 54 and 60 months old of age. Each questionnaire contains 30 questions (6 for each sector). The child will be assigned as "suspected delay development" if he/she achieves the score less than the cutoff point which is the score at two standard deviation below the mean reference of the ASQ-3 english version.

The focus of the present study was on the concurrent validity of the 18, 24, and 30 month age-specific questionnaires of the ASQ-3 comparing with the DDST-II. These age groups are the age when Thai children visiting well child clinic for their routine vaccination schedule.

In the present study, the authors were unable to compare the ASQ-3 with the Bayley Scales of Infant and Toddler Development (BSID) which is the current gold standard in young children developmental diagnosis due to limited time and resources. However, the authors supposed that comparing a new tool with an existing acceptable tool could provide relevant

information to determine the usage and validity of the new tool. Therefore, the authors decided to use the DDST-II as the gold standard for the present study.

Although the DDST-II is a developmental screening tool as well as the ASQ-3, it has been used as a standard developmental screening tool in Thailand for more than twenty years, we believe that if conducted thoroughly by a trained and experienced examiner, the DDST-II could be used as a standardized tool to determine the concurrent validity of the new screening tool (ASQ-3: Thai).

Population

The present study was performed in three toddler age groups; 18, 24, and 30 months old. For each age group, thirty children were enrolled, 15 suspected developmental delay, and fifteen with normal development.

The samples were selected from children and parents who attended the well child clinic, developmental and behavioral clinic, and general pediatric outpatient clinic and inpatient pediatric wards of Queen Sirikit National Institute of Child Health (QSNICH) from January 1st to December 31st, 2012. Informed consents for study participation were obtained from parents. The present study was approved by the QSNICH ethical committee for human subject research.

Procedure

1. The parents filled the case record form regarding the general demographic data including child's age and gender, parental age, education and employment, number of family members and monthly family incomes.

2. The researcher who is a developmental and behavioral pediatrician (BS) and has been specially trained in using the DDST-II assessed the child's developmental abilities by the DDST-II. After this stage, the child was accordingly classified into suspected developmental delay or typical normal development. Duration of assessment was recorded.

3. The parents who completed the age specific version of the ASQ-3 Thai: parents of 17 months through 18 months 30 days old child would complete the 18 months version of the ASQ-3 Thai, parents of 23 months through 25 months 15 days old child would complete the 24 months version of the ASQ-3 Thai, parents of 28 months 16 days through 31 months 15 days old child would complete the 30 months version of the ASQ-3 Thai.

The time taken to complete the questionnaire was also recorded by the researcher.

Statistical analysis

1. Descriptive statistics including percent, mean and standard deviation were used for analyzing population's demographic data.

2. Kappa analysis measured agreement between the ASQ-3 Thai and the DDST-II.

3. Cross tabulation was used for calculating sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV), to determine the concurrent validity of the ASQ-3 Thai with the DDST-II.

4. Paired samples t-test was used to compare the required administration time of both tools.

Results

There were 30 subjects in each age group equally categorized by the DDST-II into suspected developmental delay or typical normal development equally. Approximately 60% of all participants were males. An 80% majority lived in low to middle-income families. About one third of parents had graduated from universities with bachelor degree or higher. The demographic data are described in Table 1.

The overall Kappa agreements between ASQ-3 Thai and DDST-II was in the range of fair to moderate agreement (0.338-0.606)[9]. The highest Kappa agreement was found in the 30 months old group, and was lowest in the 24 months old group. In other words, the agreements between both screening tools in the 18-month and 30-month-old age groups were in moderate range, whereas the agreement between them for the 24-month-old questionnaire was in the fair range of agreement.

The validity of ASQ-3 Thai with DDST-II was further determined by measuring the sensitivity and specificity. Sensitivity and specificity were of 54.5-71.4 and 78.6-90.9 respectively. While the %PPV and %NPV was at 66.7-90.9 and 68.8-83.3, respectively. The validity and Kappa agreement for each age group are shown in Table 2.

The conducting time for each developmental screening procedure was recorded. The duration to completed 18, 24 and 30 months version of ASQ-3 Thai were 19.58$\pm$8.23, 17.68$\pm$7.71 and 17.95$\pm$6.40 minutes, respectively. Developmental screening by the DDST-II needed 15.67$\pm$8.51, 13.84$\pm$6.06, and 18.29$\pm$8.35 minutes for 18, 24, and 30 months old groups, respectively. The result showed that administration time of ASQ-3 Thai

was statistically significant higher than DDST-II in 24 months old group as described in Table 3.

Discussion

Although the DDST-II and the ASQ-3 have many different aspects in term of administration and scoring system, the four developmental domains of DDST-II and the five domains of ASQ-3 Thai were comparable as shown in Table 4.

Upon detailed analysis of the result of using both tools, we found the highest correlation in gross motor domain between the tools. The language (DDST-II)/communication (ASQ-3 Thai) and personal-social (DDST-II)/personal-social (ASQ-3 Thai) domains were correlated less than the motor domains.

Therefore, the authors suspect that the differences of equivalent domains from both developmental screening tools particularly in communication section, which was quite significant in the 24-month-old, may be the cause of the disagreement along standards for strength of agreement for the Kappa coefficient[9] between these two studied tools. When comparing the studied results with previous studies from other Asian countries, the authors found

Table 1. Demographic data of study participants

Demographic data	18 months, n = 30 (%)	24 months, n = 30 (%)	30 months, n = 30 (%)
Gender			
Male	18 (60)	19 (63.33)	18 (60)
Age (months)	18.07±0.62	24.50±0.73	30.32±0.71
Family members	3.91±0.85	4.32±1.42	3.94±0.94
Monthly family incomes			
≤40,000 baht	25 (83.33)	23 (76.67)	25 (83.33)
Father age (years)	35.63±10.10	34.05±6.49	34.06±9.13
Education			
Primary school	3 (10)	1 (3.33)	2 (6.67)
Secondary school	10 (33.33)	14 (46.67)	10 (33.33)
Vocational certificate	3 (10)	1 (3.33)	11 (36.67)
Bachelor degree and higher	14 (46.67)	14 (46.67)	7 (23.33)
Employment			
Govern/state enterprise	2 (6.67)	7 (23.33)	8 (26.67)
Non-government	10 (33.33)	5 (16.67)	7 (23.33)
Others	18 (60)	18 (60)	15 (50)
Mother age (years)	30.04±7.12	30.50±6.89	30.06±6.82
Education			
Primary school	0 (0)	5 (16.67)	2 (6.67)
Secondary school	14 (46.67)	10 (33.34)	8 (26.67)
Vocational certificate	3 (10)	3 (10)	7 (27.33)
Bachelor degree and higher	13 (43.33)	12 (39.99)	13 (43.33)
Employment			
Govern/state enterprise	3 (10)	3 (10)	4 (13.34)
Non-government company	7 (23.34)	8 (26.67)	7 (23.33)
Others	20 (66.66)	19 (63.33)	19 (63.33)

Table 2. Sensitivity, specificity and agreement of ASQ-3 Thai with DDST-II

Validity and agreement	Sensitivity (%)	Specificity (%)	% PPV	% NPV	Kappa
18 months old	66.7	88.2	75.0	83.3	0.564
24 months old	54.5	78.6	66.7	68.8	0.338
30 months old	71.4	90.9	90.9	71.4	0.606

Table 3. Administration time for developmental screening by the use of ASQ-3 Thai and DDST-II

Administration time	ASQ-3 Thai (minutes ± SD)	DDST-II (minutes ± SD)	p-value*
18 months	19.58±8.23	15.67±8.51	0.093
24 months	17.68±7.71	13.84±6.06	0.013*
30 months	17.95±6.40	18.29±8.35	0.830

Table 4. Equivalent domains between DDSTII and ASQ-3

DDST-II domains	ASQ 3 domains
Personal-social	Personal-social
Fine motor-adaptive	Fine motor and problem solving
Language	Communication
Gross motor	Gross motor

wide range of agreement. In 2011, Ga et al[10] examined the agreement between ASQ-3 and DDST-II in Korean children. They reported a fair to good strength of relationship (Kappa agreement = 0.442) between the tools. However, in 2010 Shahshahani et al[11] found a weak estimated consistency coefficient (consistency coefficient = 0.21) of both tools in developmental screening of Iranian children. Nevertheless, the two mentioned studies were conducted in different populations from our study. Children in both studies were enrolled from birth through 6 years old, whereas the present study focused only on the 18, 24 and 30 months old children, which are the age groups that the American Academy of Pediatrics (AAP) recommended for formal developmental screening[2,12,13].

The fair to moderate Kappa agreement of the ASQ-3 Thai with the DDST-II was also reported in another study to determine the concurrent validity between the tools in 36, 48, and 60 month old Thai children[14]. However, previous studies have also investigated the correlation of other developmental screening tools such as the Parent's Evaluation of Developmental Status (PEDS)[6,15] and demonstrated an agreement between the DDST-II and the PEDS in the same range. These findings demonstrated that different screening tool may produce diverse screening outcomes.

The sensitivity and specificity of the ASQ-3 Thai with the DDST-II were 54.5-71.4% and 78.6-90.9%, respectively. Since the acceptable sensitivity and specificity levels are between 70-80%[2,12,13], the sensitivity from the present study was relatively low, but the specificity was in acceptable range.

The child who was "suspect delay" by the DDST-II may not be identified as delay by the ASQ-3 Thai, but if the child was normal screening by the DDST-II, he was more likely to be screened as normal by the ASQ-3 Thai as well (specificity level of 78.6-90.9%). Therefore, the ASQ-3 Thai may be acceptable as a developmental screening tool for Thai children with high specificity and good enough sensitivity. However, comparing the results from these two screening tools with the gold standard of developmental assessment is recommended particularly in suspected developmental delay children.

The positive predictive values (%PPV) and negative predictive values (%NPV) of the ASQ-3 Thai with the DDST-II were 66.7-90.9 and 68.8-83.3, respectively. The differences in the prevalence rates of a disorder in diverse population have a vast effect on the predictive value of a screening tool in clinical application[17-19].

Since the prevalence of developmental delay in the studied population was at 50 percent in accordance to the purpose and the design of the study to determine the validity of the tool, whereas the estimated prevalence rate of developmental delays in preschoolers in Thai is about 3-10 percent. Hence, application of the current %PPV and %NPV to another population should be done with caution[14,16].

Child development is a dynamic process. All children should receive developmental screening with standardized tool to detect developmental disorders[2]. Developmental screening is a very crucial in promoting mentally healthy children. Pediatricians should have knowledge regarding the psychometric properties of the selected tools. Besides, the specific characteristic of each screening tool should be considered because different tools have different strengths and weaknesses and have been designed to detect specific developmental problems. Moreover, developmental screening in children under the age of 6 years should be periodically performed in order to identify children at risk for developmental disorders in clinical practices. Efficient assessment will lead to effective early intervention, which will help children achieve their maximum developmental potentials.

Limitations

1) The calculated sample sizes for obtaining 90% confidence interval (CI) were 350 participants in each age group. However, due to limited time to conduct the study, the authors could recruit only 30 participants for each group. This undersized studied population may have some effect on the study outcomes.

2) The ASQ-3 was originally designed to be filled out by parent while observing their child in home setting over a period of time. However, due to implementation difficulties, the ASQ-3 Thai in this study had to be introduced to the participants during their hospital visitation with limited time to complete the questionnaires. Parental access to the ASQ-3 Thai before visitation may have improved the accuracy of data because they would have had adequate time to learn about the questionnaires and observe their child's behaviors accordingly.

3) Cross cultural limitation is a common obstacle in translating and applying Western-designed questionnaires into non-English speaking country with different cultural background. For instance, the ASQ-3 has some questionnaire items, which may not be applicable in some Thai families such as "Can your child string small items such as beads, macaroni, or pasta 'wagon wheels' onto a string or shoelace?" This type of culture-bound question may not elicit a prompt or accurate response from the parents since they may never have experienced this activity before hand. Distributing the questionnaire prior to clinical visitation for practicing and behavioral observations would help to elicit a more accurate developmental level.

Suggestions

In some countries, the ASQ-3 system of developmental screening is highly flexible and can be provided via many methods such as mailing out, online, telephone interview, home visit or on site[7]. In general, the time to complete the questionnaire is about 10-15 minutes while the average time for the DDST-II is 10-20 minutes[2]. In contrast, this study provided the ASQ-3 Thai to parent only at developmental and behavioral pediatrics service office and the questionnaires were completed by the parents during the first visit. They had very few chances to learn about the items and took a relatively longer time to complete. The ASQ-3 Thai conduction time tended to be longer than the DDST-II. A flexible administration module should be developed systemically to improve the accessibility and the accuracy of the screening outcome including an effective use of time needed to complete the questionnaire.

The use of the ASQ-3 Thai as a developmental screening tool may be initially accompanied by other validated screening tools. Further larger investigations should be conducted for obtaining more evidence-based application of the tool clinically. Previous studies from many countries including China, South Korea, Iran, Norway, Netherland, Canada and Australia have demonstrated the benefits of the ASQ-3 in developmental screening across different languages and cultural backgrounds[10,11,20-26].

Future research comparing the ASQ-3 Thai with other diagnostic tool such as the BSID should be conducted in order to gain more insight in the clinical use of the ASQ-3 Thai version in Thai children.

Conclusion

The present study is one of the recent few clinical studies of the ASQ-3 in Thailand. Its concurrent validity with the DDST-II was in the range of general acceptable levels for developmental screening with the high specificity in all age groups. The authors had also found the fair to moderate agreement among the tools. Nevertheless, using the ASQ-3 Thai for developmental screening should be paired with other validated tools to improve the clinical accuracy of the tool.

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Potential conflicts of interest

None.

References

1. Kotchabhakdi N. Child development. In:

Hansakunachai T, Roongpraiwan R, Theeranate C, Fuengfoo A, Sujaritpong S, Noipayak P, editors. Textbook of developmental and behavioral pediatrics for general practitioners. Bangkok: Beyond Enterprise; 2011: 1-25.
2. Council on Children with Disabilities; Section on Developmental Behavioral Pediatrics, Bright Futures Steering Committee, Medical Home Initiatives for Children with Special Needs Project Advisory Committee. Identifying infants and young children with developmental disorders in the medical home: an algorithm for developmental surveillance and screening. Pediatrics 2006; 118: 405-20.
3. Srisurapanont M, Disayavanish P, Disayavanish C. Measures in psychiatry: users' guide. J Psychiatr Assoc Thai 2001; 46: 127-35.
4. Choomchuay J. Screening questionnaire in child and adolescent psychiatry. In: Piyasil V, Ketumarn P, editors. Textbook of child and adolescent psychiatry. Vol. 2. Bangkok: Tana Press; 2007: 87-93.
5. Kotchabhakdi N, Lertawasadathakul O. Training Manual Denver II (Thai version). 3rd ed. Nakhon Pathom: National Institute for Child and Family Development, Mahidol University; 2008. (in Thai).
6. Sices L, Stancin T, Kirchner L, Bauchner H. PEDS and ASQ developmental screening tests may not identify the same children. Pediatrics 2009; 124: e640-7.
7. Squires J, Twombly E, Bricker D, Potter L. ASQ-3 User's guide. 3rd ed. Baltimore: Paul H. Brookes Publishing; 2009.
8. Saihong P. Evaluating reliability and use of the ages and stages questionnaires [dissertation]. Eugene, OR: University of Oregon; 2009.
9. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics 1977; 33: 159-74.
10. Ga HY, Kwon JY. A comparison of the korean-ages and stages questionnaires and denver developmental delay screening test. Ann Rehabil Med 2011; 35: 369-74.
11. Shahshahani S, Vameghi R, Azari N, Sajedi F, Kazemnejad A. Validity and Reliability Determination of Denver Developmental Screening Test-II in 0-6 Year-Olds in Tehran. Iran J Pediatr 2010; 20: 313-22.
12. Radecki L, Sand-Loud N, O'Connor KG, Sharp S, Olson LM. Trends in the use of standardized tools for developmental screening in early childhood: 2002-2009. Pediatrics 2011; 128: 14-9.
13. American Academy of Pediatrics, Committee on Children with Disabilities. Developmental surveillance and screening of infants and young children. Pediatrics 2001; 108: 192-6.
14. Pichairakporn S, Ularntinon S. Concurrent validity of the ages & stages questionnaires, third edition, Thai version (ASQ-3 Thai) with the Denver Developmental Screening Test II (DDST-II) in developmental screening of 36, 48, and 60 months old children at Queen Sirikit National Institute of Child Health. Thai Pediatr J. In press 2013.
15. Theeranate K, Chuengchitraks S. Parent's Evaluation of Developmental Status (PEDS) detects developmental problems compared to Denver II. J Med Assoc Thai 2005; 88 (Suppl 3): S188-92.
16. Kotchabhadi N, Ruangkarnchanasetr S. Child health supervision. In: Ruangkarnchanasetr S, Chongviriyaphan N, Pienvichit P, Hetrakul P, editors. Pediatrics: guidelines for the diagnosis and treatment. Vol. 1. Bangkok: Beyond Enterprise; 2004: 244-62.
17. Jaeschke R, Guyatt G, Sackett DL. Users' guides to the medical literature. III. How to use an article about a diagnostic test. A. Are the results of the study valid? Evidence-Based Medicine Working Group. JAMA 1994; 271: 389-91.
18. Jaeschke R, Guyatt GH, Sackett DL. Users' guides to the medical literature. III. How to use an article about a diagnostic test. B. What are the results and will they help me in caring for my patients? The Evidence-Based Medicine Working Group. JAMA 1994; 271: 703-7.
19. Fletcher R, Fletcher S, Wagner E. Clinical epidemiology the essentials. 3rd ed. Baltimore: Williams & Wilkins; 1996.
20. Heo KH, Squires J, Yovanoff P. Cross-cultural adaptation of a pre-school screening instrument: comparison of Korean and US populations. J Intellect Disabil Res 2008; 52: 195-206.
21. Elbers J, Macnab A, McLeod E, Gagnon F. The Ages and Stages Questionnaires: feasibility of use as a screening tool for children in Canada. Can J Rural Med 2008; 13: 9-14.
22. Limbos MM, Joyce DP. Comparison of the ASQ and PEDS in screening for developmental delay in children presenting for primary care. J Dev Behav Pediatr 2011; 32: 499-511.
23. Bian XY, Yao GY, Squires J, Wei M, Chen CI, Fang BH. Studies of the norm and psychometric

properties of Ages and Stages Questionnaires in Shanghai children. Zhonghua Er Ke Za Zhi 2010; 48: 492-6.
24. Kerstjens JM, Bos AF, ten Vergert EM, de Meer G, Butcher PR, Reijneveld SA. Support for the global feasibility of the Ages and Stages Questionnaire as developmental screener. Early Hum Dev 2009; 85: 443-7.
25. Richter J, Janson H. A validation study of the Norwegian version of the Ages and Stages Questionnaires. Acta Paediatr 2007; 96: 748-52.
26. Nicol P. Using the Ages and Stages Questionnaire to teach medical students developmental assessment: a descriptive analysis. BMC Med Educ 2006; 6: 29.

การศึกษาความเที่ยงตรงของแบบคัดกรองพัฒนาการ Ages & Stages Questionnaires, Third Edition: ASQ-3 ฉบับภาษาไทย เทียบกับ Denver Developmental Screening Test II (DDST-II) ในการคัดกรองพัฒนาการเด็กอายุ 18, 24 และ 30 เดือน ที่สถาบันสุภาพเด็กแห่งชาติมหาราชินี

เบญจพร ศรีนิธิวัฒน์, ศิริรัตน์ อุพารตินนท์

วัตถุประสงค์: *เพื่อศึกษาหาค่าความเที่ยงตรง (validity) และความสอดคล้องของแบบคัดกรองพัฒนาการ ASQ-3 ฉบับภาษาไทย เทียบกับแบบคัดกรองพัฒนาการ DDST-II*

วัสดุและวิธีการ: *ทำการศึกษาในกลุ่มเด็กอายุ 18, 24 และ 30 เดือน ที่มารับบริการในสถาบันสุขภาพเด็กแห่งชาติมหาราชินี โดยแบ่งประชากรที่ศึกษาเป็น 3 กลุ่มๆ ละ 30 คน ซึ่งประกอบด้วยเด็กที่ปกติ กลุ่มละ 15 คน และเด็กที่สงสัยพัฒนาการล่าช้ากลุ่มละ 15 คน จากการคัดกรองด้วย DDST-II และให้ผู้ปกครองประเมินพัฒนาการของบุตรหลานด้วย ASQ-3 ฉบับภาษาไทย โดยใช้ cross tabulation ในการคำนวณค่าความเที่ยงตรง (validity) ของ ASQ-3 ฉบับภาษาไทย เทียบกับ DDST-II และใช้ Kappa analysis หาความสอดคล้องระหว่าง ASQ-3 ฉบับภาษาไทย และ DDST-II*

ผลการศึกษา: *แบบคัดกรองพัฒนาการทั้ง 2 ชนิด มีค่าความสอดคล้องที่ระดับ fair to moderate agreement (Kappa agreement = 0.338-0.606) โดยพบค่าความไวและความจำเพาะของ ASQ-3 ฉบับภาษาไทย เทียบกับ DDST-II ที่อายุ 18, 24 และ 30 เดือน เท่ากับ 66.7% และ 88.2%, 54.5% และ 78.6%, 71.4% และ 90.9% ตามลำดับ และมีค่า %PPV และ %NPV โดยรวม เท่ากับ 66.7-90.9 และ 68.8-83.3*

สรุป: *การศึกษานี้ถือเป็นการศึกษาเบื้องต้น (preliminary study) เพื่อพัฒนาแบบคัดกรองพัฒนาการ ASQ-3 ฉบับภาษาไทย ในการนำมาใช้ในเชิงคลินิก แต่จากผลการศึกษาความสอดคล้องของ ASQ-3 ฉบับภาษาไทย และ DDST II อยู่ในระดับปานกลาง การนำไปใช้อาจจำเป็นต้องใช้ควบคู่กับการคัดกรองรูปแบบอื่นร่วมด้วยในระยะแรก เพื่อหาข้อมูลสนับสนุนการใช้เพิ่มเติมในอนาคต*
