Intelligence and Learning Disabilities Measurement of Children with Cleft Lips and Palates Age 6 to 12 Years

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Background: *Cleft lip and palate is a craniofacial congenital defects. Most syndromes with facial clefts have intellectual disability. However, both types of cleft are commonly associated with intellectual , speech and language disorders.*
Objective: *To determine the intellectual function and learning disorder of the selected 10 school- age children with cleft lip and palate living in Khon Kaen province, Thailand,*
Material and Method: *The standard IQ test (Wechsler Intelligence Scale for Children – 3rd edition) and learning achievement test by Wide Range Achievement Test-Thai version (WRAT-Thai) were performed in the 10 Children with cleft lip and palate aged between 6-12 years at Srinagarind Hospital.*
Results: *Mean IQ score of participants was 90.5, (SD =11.2). One case had IQ score below normal range (IQ=63) and meet criteria of intellectual disorder. Three cases met criteria of leaning disorder.*
Conclusion: *The majority of children with cleft lip and palate had average IQ. 1/10 had intellectual disorder and three of them had learning disorder.*

Keywords: *Cleft lip and palates, intelligence, intellectual disabilities disorder, learning disorder*

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Cleft lip and palate (CLP) is a craniofacial congenital anomaly with an incidence of 1 in 600 live births in the northeast region of Thailand[1] . Facial clefts are ranked as the 4th common birth anomaly in newborn while 70% of them are non-syndromic facial clefts and 30% are syndromic in nature. Children with syndromic facial clefts often present with intellectual disability. However, both types of cleft lip and palate are commonly associated with intellectual disability, speech and language disorder, facial disfigurement, hearing loss, behavior and personality disorder[2,3].

The cause of intellectual disability in CLP was previously thought to be secondary to ear infection, hearing impairment, speech and language impairment. Recently studies, show evidences that intellectual disability are primary and resulting from abnormal development of structure and function of brain during neural tube formation of the embryogenesis. The MRI studies have revealed small volume of brain in children with isolated clefts. Some studies have observed that anatomical abnormality in brain associated with a non-fluent/dyslexic reading pattern in children with clefts[4,5].

Children with non- syndromic cleft may have higher IQ than syndromic cleft. Many studies reported intellectual problems in non-syndromic clefts, and in subtest of IQ test, they have low verbal IQ score than performance IQ score. However, no difference in IQ level in different types of cleft and improvement IQ scores are observed as the children grow older. The studies about learning achievement in children with cleft lip and palate to identify specific learning disorder found that the incidence of Learning disorder (LD), especially reading disorder type, is higher than general children[2-6].

The intellectual score (IQ) in normal children were classifies into extremely high (130 and above), very high (120 to 129), high average (110 to 119), average (90 to 109), low average (80 to 89), very low (70 to 79), extremely low or intellectual disability disorder (69 and lower). The intellectual disability disorder or mental retardation are classified into mild, moderate, severe and profound mental retardation as having IQ scores of 50 to 70, 35 to 50, 20 to 35, and less than 20, respectively[1]. The standard IQ test (Wechsler Intelligence Scale for Children-3rd edition) is a standard test to identify children's IQ, while diagnosis for learning

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disorders is done using the Wide Range Achievement test-Thai version (WRAT-Thai) to identify reading, writing and mathematics learning disorder.

The objectives of this study were to measure intellectual function (IQ) and learning disorder of the children with cleft lip and palate aged between 6 to 12 years at Srinagarind Hospital, Khon Kaen University, Thailand.

Material and Method

The standard IQ test (Wechsler Intelligence Scale for Children-3rd edition) and learning achievement test by Wide Range Achievement test-Thai version (WRAT-Thai) were performed in 10 children with cleft lip and palate aged between 6 to 12 years at Srinagarind Hospital. These children were originally selected from a principle project entitled "Home and environment survey, development and intelligence and learning disabilities measurement of children with cleft lips and palates, in which the main project recruited 20 children and their families (10 preschool students aged less than 6 years and 10 school-age children aged 6 to 12 years). The present study was approved by the Khon Kaen University Human Research Ethics Committee: Project number HE591110 studied in from December 2016 to May 2017. In principle project there were 20 subjects and families (10 preschool children, <6 years and 10 school age children 6 to 12 years). The present study was approved by Khon Kaen University human research ethics committee (the project number HE 591110). The clinical psychologists used the standard tool Thai version, that were validated with Thai children. The standard IQ test (Wechsler Intelligence Scale for Children-3rd edition) used to determine intellectual disabilities, Wide Range Achievement test-Thai version (WRAT-Thai) used to determine learning disorder. The results were present in mean and percentage (Table 1).

Ethical approval

The present study was approved by the Khon Kaen University Human Research Ethics Committee: Project number HE591110 studied in from December 2016 to May 2017. In principle project there were 20 subjects and families (10 preschool children, <6 years and 10 primary school children with a age range between 6 to 12 years).

Results

Mean age was 8.8 years, including 6 boys and 4 girls. The majority of children were non-syndromic CLP (9/10 cases). All children attended regular school program, and being in appropriate class level to their age except one child was delayed, because of learning disorder in mathematics. The mean IQ score of participating children was 90.5, range 69 to 108. One case had mild intellectual disability disorder (IQ = 69).

Learning disorder (LD) is a developmental disorder of children who has difficulties learning and using academic skill in reading or spelling (dyslexia) or written expression (dysgraphia) or mastering of number (dyscalculia). In this present study, there were 3 children (30%) met criteria for diagnosis of LD. Two children were dyscalculia (one boy, and one girl), another boy had mixed type of dysgraphia and dyscalculia and mathematics.

The type of cleft lip and palate might associate with IQ score and achievement score, four children with bilateral complete cleft lip with alveolar cleft with cleft palate had mean IQ = 79 (SD = 16.6), less than 6 children with left lateral complete cleft lip with alveolar cleft with cleft palate had mean IQ = 89.8 (SD = 12.77). All three children with LD had bilateral complete cleft lip with alveolar cleft with cleft palate. Bilateral CLCP seem to have brain pathology more than unilateral CLP. One children with Mathematic LD was studying studying below his grade (in Grade 3 but, actually supposed to study in Grade 12).

Discussion

In general, we have known that children with syndromic CLP may have intellectual and learning problems. In this present study, one case with syndromic CLP called Pierre Robin syndrome, 9 cases were non-syndromic CLP. Their mean IQ score was 90.5 which was average IQ, and only one had mild intellectual disability. Only 30% of the children with CLP in this present study had met criteria of learning disorder. However, the sample size was only 10, thus LD in CLP might be higher than general population (5 to 12%)[7]. The children with CLP need to evaluate cognitive and achievement ability to detect the intellectual deficit and learning disorder during school age. These problems should be solved by providing special educational programs under a national education law to keep them in the track and for their future career path.

Conclusion

The IQ and achievement tests in the children with cleft lip and palate reveal average IQ. One in ten cases had mild intellectual disabilities and three were

Table 1. Demographic data of the participating children

Gender	Diagnosis	Comorbid	VIQ	PIQ	FIQ	R	W	M	Age (years)	School (Grade level)
Female	1	-	102	113	108	95	93	94	9	5
Female	1	H	70	72	69*	81	73	94	8	2
Male	2	-	95	93	93	93	84	67**	12	3***
Female	1	-	95	82	88	113	99	100	9	3
Male	1	-	89	84	86	89	81	70	6	2
Male	1	-	110	95	103	95	90	91	8	1
Male	2	-	104	100	102	94	88	75**	10	3
Female	2	-	94	90	92	53**	52**	63**	9	3
Male	2	P	75	87	79	76	69	67	9	3
Male	1	-	89	83	85	85	76	97	8	2
		Mean	92.3	89.9	90.5	87.4	80.5	81.8	8.8	
		SD	11.75	10.7	11.2	14.86	12.95	13.56	1.46	

For diagnosis: 1 = Left complete cleft lip with alveolar cleft with cleft palate; 2 = bilateral CLCP
VIQ = verbal IQ; PIQ = performance IQ; FIQ = full IQ; R = reading score; W = writing score; M = Mathematic score; H = Hypothyroid; P = Pierre Rubin syndrome; SD = standard deviation.
* 69 = mild intellectual disability, ** LD = learning disorder, *** Below age-grade level

met criteria of learning disorder. The children with CLP need to evaluate cognitive and achievement ability to detect the intellectual deficit and learning disorders during their school age.

What is already known on this topic?

The intellectual problems in children with cleft lip and palate have to be concerned and monitored.

What this study adds?

Thai children with CLCP need to measure IQ and achievement tests to provide remedial therapy for them including, education programs, understand them and not leave them behind their peers.

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Potential conflicts of interest

None.

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การประเมินความสามารถด้านเชาวน์ปัญญาและการเรียนในเด็กปากแหว่งเพดานโหว่วัยเรียน 6-12 ปี

จินตนา สิงขรอาจ, พีรดา อุ่นไพร, ชณัตพร ชลไพร, หัฏฐกร สำเร็จดี, นิรมล พัจนสุนทร

ภูมิหลัง: ปากแหว่งเพดานโหว่เป็นพัฒนาการบนใบหน้าที่ผิดปกติมาแต่กำเนิด คนที่มีภาวะปากแหว่งร่วมกับที่มีกลุ่มอาการส่วนมากจะมีเชาวน์ปัญญาบกพร่อง แต่ปากแหว่งทั้งสองชนิดมักสัมพันธ์กับภาวะเชาวน์ปัญญาบกพร่อง ภาษาและการพูดบกพร่อง

วัตถุประสงค์: เพื่อประเมินการทำหน้าที่ทางเชาวน์ปัญญาและหน้าที่ในการเรียนรู้ของเด็กนักเรียนที่มีภาวะปากแหว่งเพดานโหว่ จำนวน 10 คน

วัสดุและวิธีการ: ใช้แบบทดสอบมาตรฐานตรวจวัดเชาวน์ปัญญา คือ Wechsler Intelligence Scale for Children-3rd edition (WISC-III) และแบบทดสอบ สัมฤทธิผลทางการเรียนรู้ คือ Wide Range Achievement Test-Thai version (WRAT-Thai) กับเด็กนักเรียนที่มีภาวะปากแหว่งเพดานโหว่ที่มีอายุระหว่าง 6-12 ปี ที่มารับการรักษาที่โรงพยาบาลศรีนครินทร์จำนวน 10 คน

ผลการศึกษา: คะแนนเฉลี่ยเชาวน์ปัญญาของประชากรคือ 90.5 มี 1 คน จาก 10 คน มีคะแนนต่ำเข้าเกณฑ์การวินิจฉัยเชาวน์ปัญญาบกพร่อง และมี 3 คน เข้าเกณฑ์การเรียนรู้บกพร่อง

สรุป: เด็กที่มีภาวะปากแหว่งเพดานโหว่ส่วนใหญ่เชาวน์ปัญญาปกติมี 1 ใน 10 คน มีเชาวน์ปัญญาบกพร่อง และมี 3 คน จากทั้งหมดมีการเรียนรู้บกพร่อง