

# Incidence of developmental dysplasia of the hip in Dubai

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## ABSTRACT

**الأهداف:** إعطاء قاعدة معطيات عن حدوث خلل تطوُّري في مفصل الورك (DDH) بين المواليد دبي – الإمارات العربيّة المتّحدة.

**الطريقة:** تم إجراء دراسة استيعادية بين المواليد في مستشفى دبي في حالة شك وجود أي خلل تطوُّري في مفصل الورك وإعطاء العلاج اللازم، وذلك خلال الفترة ما بين يناير 2004 حتى ديسمبر 2005 م وتمت متابعة المواليد من عام كحد أدنى إلى عامين كحد أقصى.

**النتائج:** تمت ولادة 3786 مولود في مستشفى دبي خلال فترة الدراسة، شكّت في حالة 101 طفل من المواليد بوجود خلل تطوُّري في مفصل الورك. وجد خلل حقيقي لدى 12 حالة واحتاجت حالة واحدة إلى عملية الجراحية.

**خاتمة:** تم الشك في وجود خلل تطوُّري في مفصل الورك في 27 لكل 1000 حديث الولادة في دبي. أكد الطب الإشعاعي وجود حالات من خلل تطوُّري في مفصل الورك كانت نسبة الحدوث 3.17 لكل 1000 من مواليد المواطنين الإماراتيين في دبي.

**Objectives:** To provide a database on the incidence of developmental dysplasia of hip (DDH) among newborns in Dubai, United Arab Emirates (UAE).

**Methods:** This is a retrospective study of babies born in Dubai Hospital, Dubai, UAE, suspected of having hip dysplasia. Their case records were studied, and the conclusions and treatment were analyzed. The study period was from January 2004 to December 2005, and the cases were followed up for a minimum period of one year and maximum period of 2 years.

**Results:** Three thousand seven hundred and eighty-six babies were born in Dubai Hospital in the study period. One hundred and one had clinical suspicion of hip dysplasia. Twelve children among them had true dysplasia and one required surgery.

**Conclusion:** Twenty-seven per 1000 newborns in Dubai had clinical suspicion of hip dysplasia at birth.

The incidence of radiologically confirmed cases of developmental dysplasia of hip was 3.17 per 1000 live births among UAE nationals in Dubai.

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Developmental dysplasia of the hip (DDH) if detected early can be treated with minimum morbidity in childhood. Screening neonates clinically and by imaging has reduced the incidence of hip dislocation. The incidence of DDH is high in the Middle East, but there are only a few studies from the Gulf cooperation council countries.<sup>1-4</sup> Some studies highlighted the tradition of swaddling as contributing to the higher incidence of DDH.<sup>3,5,6</sup> The incidence of DDH among newborns in Dubai has not been previously studied. Dubai Hospital is a major center of childbirth in the city catering for nationals and expatriates living in the northern part of the city of Dubai. The aim of this study was to provide a database on the incidence of DDH among the United Arab Emirates (UAE) nationals. Though almost an equal number of expatriate children are also born in Dubai Hospital, they form a heterogeneous group belonging to different countries. For this reason, children among the expatriate population were excluded.

**Methods.** This was a retrospective study of the newborns treated at Dubai Hospital for suspected hip dysplasia. The study period extended from January 2004 to December 2005 and was conducted in Dubai Hospital, Dubai, UAE. The minimum follow up period was one year and maximum was 2 years. Newborns with teratogenic and paralytic dislocations of the hip and expatriates were excluded from this study. Approval

of the ethical committee of Dubai Hospital was obtained prior to the study. All children born in the hospital were seen by the neonatologists and examined clinically for hip instability. Examination included Barlow and Ortolani tests, hip abduction, and click. The Orthopedician saw all neonates with positive Ortolani or Barlow tests immediately. Other suspected cases were referred to the orthopedic clinic for further evaluation and were seen at 3-4 weeks. A detailed history was taken from the parents including possible consanguinity and family history of hip disease. Each child was examined for the range of movement of both hip joints, range of abduction with the hip in 90-degree flexion, and the Ortolani and Barlow tests. Children found normal initially were followed up at 3 months, 6 months, and one year of life. All children underwent imaging study during the first 6 weeks. Radiography of the hips was carried out in 62 children at 6 weeks of age and was repeated at 6 months and one year. Thirty-nine had ultrasound examination in the first 6 weeks instead of radiography, but thereafter had x-ray examination. Children born in 2004 had only x-ray examination at 6 weeks as ultrasound for children was not available. Children with abnormal clinical or radiological findings were reviewed more frequently and treated with a Pavlik harness. The criteria for radiological diagnosis of hip dysplasia were an acetabular index more than 30° and a laterally displaced metaphysis of femur as noticed by the shift from the inner lower quadrant as formed by the transection of Hilgenreiner's and Perkins' lines. The acetabular index is the angle formed between the y-line, and an oblique line passing through the depth of the acetabular socket from the y-line to the most lateral ossific margin of the roof of the acetabulum. An acetabular angle of more than 30 degrees and a laterally placed upper femoral metaphysis were considered abnormal. Graf alpha angle less than 56 degrees were considered abnormal. Measurement between 56-60 degrees was considered immature, and the baby was followed up without a harness.

**Results.** Of the 101 neonates with clinically abnormal or suspicious hips, there were 73 girls and 28 boys. The left hip was affected in 56 children, bilateral in 31 and right sided in 14. Four children were born to consanguineous parents and one of them had a family history of hip dysplasia. There were 69 normal deliveries, 29 cesarean sections, 2 breech, and one forceps delivery. There were 40 first born, 11 second, 22 third, 8 fourth, 11 fifth, 4 sixth, 3 seventh, and 2 eighth born children. The average birth weight of the children was 3.165 kg (range 1.92 - 4.265). Twelve children had true dysplasia of hip, 8 both clinical and radiological, and 4 radiological alone. At birth, 8 children had positive Barlow's test, 4

on the left hip, 2 bilaterally, and 2 on the right. One of them had a positive Ortolani's test (Table 1). Among the 12 children, 9 had ultrasound examination but the remaining 3 had only x-ray imaging. Two children with positive Barlow's test had normal x-ray findings, and another 2 who were normal clinically had abnormal x-ray findings. Four among the 12 children had abnormal ultrasound with normal clinical findings. In addition, there were 4 other children among the 101 with immature hips (Graf's angle 56° to 60°). Eleven children were treated with a Pavlik harness. One was lost to follow up. Of the 11, 8 improved within the first 3 months, and 2 by 6 months. One child with bilateral dislocations did not improve with Pavlik harness and underwent closed reduction. This was successful on the right, but the left side remained dislocated, and she underwent open reduction and femoral osteotomy at the age of 2 years.

**Discussion.** Many factors contribute to the development of hip dysplasia including ligamentous laxity, mechanical forces, intrauterine malposition, genetic influences, and post-natal environmental factors.<sup>7</sup> Stability may be restored so rapidly that the estimation of incidence based on examination after the third day of life is less than half that on the day of birth.<sup>8</sup> There were 101 neonates with suspected dysplasia at birth among 3786 live births (27 per 1000). By 3 to 4 weeks when these children were evaluated in the Orthopedic clinic the incidence dropped to 12/3786 (3.17 per 1000), similar to that in the Aseer region of Saudi Arabia.<sup>4</sup>

There is wide variation in the reported incidence of DDH. Edelstein et al<sup>9</sup> studied 16000 African Bantu babies, but they could not find a single case. Conversely, Walker<sup>10</sup> reported a very high incidence of 188.5/1000 children in the Island Lake region of Manitoba, Canada. Artz et al<sup>11</sup> found 4.9/1000 Negro babies compared to 15.5/1000 Caucasian babies with dysplasia in New York. The incidence among Chinese children in Hong Kong was 0.1/1000.<sup>12</sup> In Salford, England it was 1.5/1000 and approximately 1.5/1000 overall in the United States of America.<sup>13,14</sup> The difference in incidence is explained by genetic and environmental factors, age at examination, skill of the examiner, and the clinical criteria used for diagnosis. The incidence increases in colder climates, believed to be aggravated by swaddling the legs in hyperextension. In Dubai, also, it is common practice to swaddle the children.

The overall female to male ratio of suspected hip dysplasia at birth was 2.6:1 and among the 12 children having radiological or ultrasound conformation was 6:1. Mamoun et al<sup>1</sup> reported 6:1 ratio and Mirdad<sup>4</sup> reported 3.6:1 among the Saudi population. In many

**Table 1** - Master chart of developmental dysplasia of the hip (DDH) cases.

No	Gender	Side affected	Delivery	Order of birth	Clinical finding	US alpha angle	X-ray	Follow up
1	F	Right side	Normal	7 <sup>th</sup>	Barlow +ve	Nil	AI right 40°	No review
2	M	Left side	Normal	3 <sup>rd</sup>	Barlow +ve	Lt 55°	AI left 32°	Pavlik harness, normal at 3 and 6 months
3	F	Bilateral	LSCS, breech	1 <sup>st</sup>	Barlow +ve both sides	Rt 45° Lt 48°	AI right 35° left 34°	Pavlik harness, 6 months normal
4	F	Left	Normal	1 <sup>st</sup>	Barlow +ve	Rt 50° Lt 51°	AI 30° both sides	Pavlik harness, normal 3 months
5	F	Left	Breech	1 <sup>st</sup>	Barlow +ve	Rt 53° Lt 49°	AI right 28° left 35°	Pavlik harness 3 months stable, 6 months normal
6	F	Right	Normal	1 <sup>st</sup>	Barlow +ve	Rt 54° Lt 55°	AI right 32° left 28°	Pavlik harness normal at 3 months
7	F	Right	Normal	3 <sup>rd</sup>	Ortolani and Barlow -ve	Rt 54° Lt 55°	AI 30° both sides	Pavlik harness, normal at 3 months
8	M	Left	Normal, immature	4 <sup>th</sup>	Barlow +ve left	Nil	AI 30°	Pavlik harness, normal at 3 months
9	F	bilateral	LSCS	5 <sup>th</sup>	Ortolani +ve, Barlow +ve both sides	Nil	AI right 60° left 65°	Pavlik harness; adductor tenotomy 6 months, right normal, Lt. Open reduction and femoral osteotomy Lt at 2 years
10	F	Left	Normal consanguineous	2 <sup>nd</sup>	Ortolani and Barlow -ve	Rt 58° Lt 54°	AI left 30°	Pavlik harness, normal at 3 months
11	F	Right	Normal	1 <sup>st</sup>	Ortolani and Barlow -ve	Rt 50° Lt 55°	AI right 30° left 35°	Pavlik harness, 3 months normal
12	F	bilateral	Normal		Ortolani and Barlow -ve	Rt 48° Lt 45°	AI right 30° left 35°	Pavlik harness, normal at 6 months

F - female, M - male, -ve - negative, +ve - positive, Rt - right, Lt - left, AI - acetabular index, LSCS - lower segment cesarian section, US - ultrasound.

developed countries, especially Europe females are 4 to 6 times more commonly affected.<sup>7,14,15</sup> In general the left hip is affected 3 times more commonly than the right. This is due to the tendency of the fetus to lie with the left hip close to mother's spine, increasing the chance of dysplasia.<sup>8</sup> In this series, the left hip was involved about twice as commonly as the right and 4 times that of bilateral involvement. Among studies from Saudi Arabia, Mamoun et al<sup>1</sup> reported 37% left hip, 36% bilateral, and 26.5% right hip involvement, and Mirdad's series had bilateral involvement in 50% of cases and the left/right side was almost equally divided among the remainder.<sup>4</sup>

According to Laurenson<sup>16</sup> it is helpful measuring the development of the acetabulum by means of acetabular angle. The mean value is 27.5<sup>0</sup> in newborns and decreases to 20<sup>0</sup> by 2 years of age. Mean values above 30<sup>0</sup> are considered abnormal. The diagnosis of hip dysplasia can not be made on acetabular index alone.<sup>17</sup> Positioning of the patient significantly changes the acetabular index through rotation of pelvis in axial or sagittal planes.<sup>8</sup> The reported risk factors for DDH are female gender, family history, breech presentation, multiple gestation, first pregnancy, high birth weight, oligohydramnios, and postural abnormalities such as

clubfoot and torticollis.<sup>13</sup> None of the children in this series had other congenital malformations. Ultrasound evaluation of the acetabulum by measuring Graf's angles is now routinely used in many centers for screening neonates.<sup>18</sup> There is debate whether it is needed, as this involves more expenditure on investigations. Also, there was obvious increase in the intervention rate in the general ultrasound screening group compared with both selective ultrasound screening and non-screening groups.<sup>19</sup> General ultrasound screening identified 130/1000 dysplasia in clinically normal infants, 97% of them showed spontaneous resolution by 3 months of age.<sup>19</sup> In this study, 4 neonates had abnormal ultrasound results with normal clinical findings. Another 4 infants had immature hips with Graf's angle of 57-60 degrees, which improved without any intervention. Swaddling the newborn is very common in Dubai. Parents of all children attending the clinic were advised against this, but there was no record of the incidence of swaddling prior to counselling. Chaarani et al<sup>3</sup> have shown that community education on the harmful effects of swaddling the newborn has reduced the incidence of DDH in Qatar.

However, this paper has some limitations being a retrospective study. The social customs and habits in

caring for the newborn, including swaddling were not considered. True ethnicity and social background of the study group were also not considered.

In conclusion, this study showed that the incidence of persisting DDH in infants born to UAE nationals in Dubai hospital is 3.17/1000 live births compared with an incidence on the first day of 27/1000 live births. Forty percent of the children were first born, and girls were 6 times more commonly affected than boys. Ultrasound examination would detect more cases. One child had progression of dysplasia in spite of bracing and needed surgical correction.

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### Related topics

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