The pattern of developmental dysplasia of the hip

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ABSTRACT

Objectives: This study was conducted to enlarge the knowledge of developmental dysplasia of the hip (DDH) in the Kingdom of Saudi Arabia (KSA), and to compare its presentation among Saudi population to known international figures.

Methods: A prospective study of Saudi patients with DDH that presented to King Khalid University Hospital, Riyadh, KSA over 5 years starting September 1996. The information needed was obtained directly from one or both parents.

Results: Six hundred Saudi children were included in this study. The diagnosis of DDH was delayed in most patients. The results give an impression that parents' consanguinity, positive family history, breech deliveries and the use of swaddling have direct relation with increased incidence of DDH in the Saudi population.

Conclusion: A national screening program is needed in KSA. Furthermore, nationwide studies will help to identify groups at risk and the geographical distribution of the disorder.

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Developmental dysplasia of the hip (DDH) is a common disorder encountered in all major hospitals in the Kingdom of Saudi Arabia (KSA). However, not much is written concerning the disorder in the Saudi population. This study is designed to enlarge the knowledge of DDH in KSA, to study the effect of Saudi environment and culture on the known risk factors of the disorder, and to compare its presentation in KSA to known international figures.

Methods. This is a prospective study of Saudi patients with DDH that presented to the pediatric orthopedic clinic of the King Khalid University Hospital, Riyadh, KSA which is a major referral center for DDH over 5 years starting from September 1996 to achieve a total of 600 patients. Patients with other nationalities were excluded as well as cases with neuromuscular or syndromic dislocations. The child's sex, type of delivery, maturity, postnatal health, age of discovery and the person who first noticed the abnormality, age at the initiation of treatment, side involved, family history, order of the child in the family, parents consanguinity, associated congenital anomalies and the use of swaddling were all recorded. The information needed was obtained through a direct communication with one or both the parent(s).

Results. A total of 600 Saudi children were included in this study. There were 513 girls (85.5%) and 87 boys (14.5%) with a female to male ratio of 6:1. The left hip was affected in 223 patients (37.1%), both hips in 218 patients (36.3%) and the right hip alone in 159 patients (26.5%). The age of discovery of DDH ranged from one day to 4 years (mean=7.6 months). The age distribution

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at the time of discovery according to age groups is shown in **Table 1.** Consanguinity among parents was present in 297 patients (49.3%). First degree cousins represented 62.3% of this group (185 patients). A positive family history of DDH was obtained in 267 patients (43%). The majority of patients were a product of full term pregnancy (580 patients, 96.7%) and normal vaginal delivery (525 patients, 87.5%). History of delivery with cephalic presentation was reported in 526 patients (87.6%), breech in 68 patients (11.4%), and transverse in 6 patients (1%). The patient was the first baby in the family in 174 patients (29%), second to fifth in 311 patients (52%), and sixth or more in 115 patients of the patients (19%). The hip abnormality was first noticed by the family in 271 patients (45%) and by physicians (pediatricians, primary care physicians or orthopedic surgeons) in 329 patients (55%). The swaddle (commonly practiced infant wrapping locally known as Mihad) was used in 426 patients (71%) for variable periods (average time of 14.3 weeks). Associated other congenital defects were seen in 24 patients (4%) (**Table 2**).

Table 1 - Age distribution at time of discovery of developmental dysplasia of the hip according to age groups (N=600).

Age group	Patients n (%)
0-1 month	151 (25.2)
>1-3 months	51 (8.5)
>3-6 months	52 (8.7)
>6-12 months	120 (20)
>1-2 years	210 (35)
>2 years	16 (2.7)

Table 2 - Congenital anomalies associated with developmental dysplasia of the hip.

Congenital anomaly	Patients affected n (%)
Congenital talipes equinovarus	6 (1)
Congenital vertical talus	2 (0.3)
Calcaneo valgus	3 (0.5)
Genu recurvatum	5 (0.8)
Inguinal hernia	4 (0.7)
Urinary tract anomalies	3 (0.5)
Gastrointestinal tract anomalies	2 (0.3)
Kyphoscoliosis	1 (0.2)
Congenital high scapula	1 (0.2)
Cardiac anomalies	3 (0.5)
Cleft palate	1 (0.2)
Deafness	1 (0.2)
Congenital dislocation of head of radius	1 (0.2)
Club hand	1 (0.2)
Polydactaly	1 (0.2)
Hydrocephaly	1 (0.2)
Microcephaly	1 (0.2)
Total	**37* (6.2)**

*congenital anomalies in 24 patients

Discussion. This study confirmed several known risk factors or populations at risk for developing DDH in KSA similar to the worldwide figures. This specifically applies to the commonly affected sex where in this study girls were affected 6 times more than boys.[1] It is generally agreed upon that the left hip is more commonly affected.[2-4] Few authors reported predominance of bilateral cases.[5] The current study showed no difference between left and bilateral affection, but both occurred more than the right side. However, the right side in the current study showed unexplainable relatively higher affection (26.5%) than most international figures, which reports the left side to be affected twice as common as the right side.[1] Mufti[6] reported 79 patients with DDH in Riyadh, KSA, that the right side was affected more than twice the left side. It was noticed that diagnosis of DDH was delayed in most patients. Only one quarter of the patients (25.2%) were diagnosed within the first month of life. In 45% of patients in this study, the families were the first to determined the disease noticing asymmetry in shape or movement or when the child started walking with a limp. The diagnosis was delayed until the child started walking in 37.6% of the cases. These findings show clearly the deficiency in the screening programs. Lack of understanding of the screeners (pediatricians and primary care physicians) of the spectrum of DDH also adds to the delay in the diagnosis of the problem. A single newborn normal hip examination is not enough to exclude DDH. The authors did not find any series that consider parents'consanguinity as a risk factor for DDH although many have mentioned family history as a risk factor.[2,7] This might be due to consanguineous marriages are rare in the West nowadays. Consanguineous marriages are still a common practice in KSA. Parents were first cousins in 30.8% of the patients and the total percentage for first, second and third degree relationship

of parents were 49.3%. These figures in the current study gives an impression that consanguinity is a possible risk factor in DDH. A positive family history was reported in the current study in 43% of the patients, which is more than double the reported figures in the literature (20%).[2,7-9] Both consanguinity and family history noticed in the current study; support the genetic theory as a contributing factor in DDH etiology. Many authors reported a high incidence of DDH affection in the first born child compared to other siblings (up to 56% of the patients are first born babies in some reports).[1-3,10] This study agrees with this observation to a lesser degree (29%). The incidence of breech deliveries in KSA is reported to be 2.8%.[11] In this study, the incidence of breech presentation in DDH patients was 11.4%, which confers with previously reported series ranging from 8.3-20%.[10,12-15] The postnatal extra uterine environment and cultural practice may play a major role in the development of DDH. Salter[16] experimentally showed that extension and adduction of animals' hips led to subluxation and dislocation. Many epidemiological studies correlated high incidence of DDH with the use of swaddling for newborns.[5,17-20] In the present study, swaddling was used in 71% of the babies after birth for an average time of 14.3 weeks, which is the most important period of the infant's life regarding the natural history of DDH. The relation between swaddling and DDH was explained in the literature by the fact that 85-90% of the unstable hips that get stabilized spontaneously might not do so in the communities where swaddling is practiced. In communities that carry the newborn around the waist of their mothers with hips abducted and flexed as in Africa, India and China the incidence of DDH is very low or even absent. This position may affect favorably the natural history of babies vulnerable to have DDH.[7,17,21,22] Many authors reported different congenital anomalies to be associated with DDH in 9-14% of patients.[1,23-25] In this study, 4% of the patients had associated congenital anomalies mostly of musculoskeletal origin (**Table 2**). However, the syndromic cases of dislocated hips which were excluded from the study, if added would have increased the prevalence of other anomalies. None of the patients in this study had either torticollis or metatarsus adductus, which are considered in the literature to be commonly associated with DDH.[23-25]

In conclusions, there is clearly a need of a good national screening program in KSA. Screening providers should take short courses in the way of screening, the risk factors of the disease and general guidelines of treatment to avoid or to minimize late presentation and wrong advice. Public awareness of the disease needs to be extended more through different media. Swaddling practice should be discouraged. Peripheral hospitals are to be urged for earlier referrals of DDH patients to higher centers but more importantly, they should be taught to screen newborns properly. Further nationwide studies are needed regarding the epidemiology of DDH in KSA with the aim of identifying groups at risk and the geographical distribution of the disease within the country.

References

1. Sharrard WJW. Congenital and developmental abnormalities of the hip. In: Sharrard WJW, editor. Paediatric Orthopedics and Fractures. 3rd ed. Oxford (UK): Blackwell Scientific Publications; 1993. p. 291-402.
2. Novacheck TF. Developmental dysplasia of the hip. ***Pediatr Clin North Am*** 1996; 43: 829-848.
3. Bennett JT, MacEwen GD. Congenital dislocation of the hip: Recent Advances and Current Problems. ***Clin Orthop*** 1989; 247: 15-21.
4. Tredwell SJ, Bell HM. Efficacy of neonatal hip examination. ***J Pediatr Orthop*** 1981; 1: 61-65.
5. Kutlu A, Memik R, Mutlu M, Kutlu R, Arslan A. Congenital dislocation of hip and its relation to swaddling used in Turkey. ***J Pediatr Orthop*** 1992; 12: 598-602.
6. Mufti MH. Prime factors in the etiology of congenital dislocation of the hip and talipes equinovarus in Riyadh. ***Ann Saudi Med*** 1988; 8: 29-34.
7. Wynne-Davies R. Acetabular dysplasia and familial joint laxity: two etiological factors in congenital dislocation of the hip. ***J Bone Joint Surg Br*** 1970; 52; 704-716.
8. Carter CO, Wilkinson JA. Genetic and environmental factors in the etiology of congenital dislocation of the hip. ***Clin Orthop*** 1964; 33: 119-128.
9. Woolf CM, Turner JA. Incidence of congenital malformations among live births in Salt Lake City, Utah, 1951-11961. ***Soc Biol*** 1969; 16: 227-229.
10. Artz TD, Levine DB, Lim WN, Salvati EA, Wilson PD. Neonatal diagnosis, treatment and related factors of congenital dislocation of the hip. ***Clin Orthop*** 1975; 110: 112-136.
11. Akinola SE, Archibong EI, Bhawani KP, Sobande AA. Assisted breech delivery, is the art fading? ***Saudi Med J*** 2002; 23: 423-426.
12. Bjerkreim I, Van Der Hagen CB. Congenital dislocation of the hip joint in Norway. Part V: Evaluation of genetic and environmental factors. ***Clin Genet*** 1974; 5: 433.
13. Wlikinson JA. The effects of breech malposition. ***J Bone Joint Surg Br*** 1964; 46-B: 156.
14. Muller GM, Seddon HJ. Late results of treatment of congenital dislocation of the hip. ***J Bone Joint Surg Br*** 1953; 35-B: 342-362.
15. Suzuki S, Yamamuro T. Correlation of fetal posture and congenital dislocation of the hip. ***Acta Orthop Scand*** 1986; 57: 81-84.
16. Salter RB. Etiology, pathogenesis and possible prevention of congenital dislocation of the hip. ***Can Med Assoc J*** 1968; 98: 933-945.
17. Shaheen MA. Mehad: The Saudi tradition of infant wrapping as a possible etiological factor in congenital dislocation of the hip. ***J R Coll Edin*** 1989; 34: 85-87.
18. Wedge JH, Wasylenko MJ. The natural history of congenital dislocation of the hip. ***Clin Orthop*** 1978; 137: 154-161.
19. Ishiada K. Prevention of the development of the typicaldislocation of the hip. ***Clin Orthop*** 1977; 126: 167-169.
20. Pratt WB, Freiberger RH, Arnold WD. Untreated congenital hip dysplasia in the Navajo. ***Clin Orthop*** 1982; 162: 69-77.
21. Edelstein J. Congenital dislocation of the hip in the Bantu. ***J Bone Joint Surg Br*** 1966; 48-B: 397
22. Hoaglund FT, Kalamchi A, Poon R, Chow SP, Yan ACMC. Congenital hip dislocation and dysplasia in Southern Chinese. ***Int Orthop*** 1981; 4: 253-256.
23. Mooney JF, Emans JB. Developmental dislocation of the hip: A clinical overview. ***Pediatr Rev*** 1995; 16: 299-303.
24. Hummer CD, MacEwen GD. The coexistence of torticollis and congenital dysplasia of the hip. ***J Bone Joint Surg Am*** 1972; 54-A: 1255-1256.
25. Kumar S, MacEwen G. The incidence of hip dysplasia with metatarsus adductus. ***Clin Orthop*** 1982; 164: 234-235.