

**PREVALENCE OF HIP JOINT INSTABILITY (DDH) IN KAUH
IN JEDDAH, SAUDI ARABIA
A CORRELATION BETWEEN CLINICAL AND SONOGRAPHIC SCREENING**

* Dr. Soad M. Jaber, M.D.

** Prof. Mohammed El Sobki

*** Dr. Hisham Sabber

* Dr. Ali Shaabat

* Dr. Nadia Fida

* Dr. Abed Al-Hazmi

* Department of Paediatrics, King Abdulaziz University Hospital , Jeddah

** Department of Orthopedic Surgery, Cairo University

*** Department of Radiology, King Abdulaziz University Hospital, Jeddah

Correspondence to:

Dr. Soad Jaber
Department of Pediatrics
King Abdulaziz University Hospital
P.O. Box 80215, Jeddah 21589
Saudi Arabia

ABSTRACT :

The incidence of the hip instability due to DDH was studied in the nursery department at KAUH from November 1995 to October 1996. Eight hundred nine newborn with 1618 hips were screened both clinically and with Graf's ultrasound techniques. Babies with neuromuscular disease or those referred with other medical problems were excluded.

The incidence was found to be 10.3 % with more prevalence in female newborn (6.6%) compared to male (3.7%) using ultrasound screening. Racial status had an insignificant effect in DDH incidence (5.6% in Saudi, 4.7% in non-Saudi). The higher incidences of DDH in the first 24 hours could be related to mother's relaxin hormone that fades away within a short duration (\pm 4 weeks). It could also be related to Graf's ultrasound type IIa⁻ which usually normalizes spontaneously later in life. A recommendation for early detection is to carry out the screening for DDH by the age of 6-8 weeks.

Keywords : DDH (Developmental dysplasia of the hip), KAUH (King Abdulaziz University Hospital)

INTRODUCTION :

Until the introduction of Graf's 1984⁽¹⁾ and Harcke's⁽²⁾ ultrasound techniques for assessment of neonatal hips, clinical examination was considered the cornerstone for diagnosis and evaluation of hip joint instability. Experience as well as good training is extremely important to maintain a high standard of screening for DDH.

Graf's method for the hip joint ultrasound is based on measuring both bony and cartilaginous roof angles (alpha and beta angles). However, this method was proved unreliable by many authors in the case of newborn babies since errors of $\pm 10^\circ$ are possible⁽³⁾.

The incidence of the hip instability due to developmental hip dysplasia is believed to be high in the Arab world due to a multifactorial predisposition⁽⁴⁾. No attempts have yet been made to carry out neonatal screening for hip instability (DDH) in the Kingdom of Saudi Arabia.

The aim of the present study is to apply Graf's method for screening the incidence of DDH among the newborn admitted to the nursery department at King Abdulaziz University Hospital in Jeddah, western region of Saudi Arabia.

A total number of 809 newborn babies that were delivered at King Abdulaziz University Hospital (KAUH) from November 1995 to October 1996 were screened for hip instability and dysplasia. The participant samples were randomly selected, regardless of their nationality, sex, weight and prenatal data. Any newborn diagnosed with neuromuscular disease or referred to the nursery department for other medical reasons

were excluded from the present study. Hip joints of both sides were examined in the coronal plane with the aid of a positioning apparatus designed by Graf (pictures 1a & b). Dynamic testing was only carried out on unstable hips⁽⁵⁾ .

STATISTICAL ANALYSIS :

Analysis of the present results were carried out using SPSS WIN ver 5.02 on an IBM compatible computer system. The data was described as frequency distribution. Numerical data was carried out using the student's test. Analysis of categorical data was carried out using the chi-square test.

RESULTS :

Demographic screening of newborn in the first 24 hours for the hip instability at KAUH showed that Saudi babies represented 51.2% of the participant sample, while non-Saudi ones were 48.8% Female to male newborn represented 48.7% and 51.3% respectively.

The incidence of abnormal ultrasound findings by measuring alpha and beta angles using Graf's techniques including Ila hips totalled to 10.3%. A significant difference between both sexes was observed in the clinical testing, limited abduction or positive ortalani. The incidence was 5.7% in female and only 1.5% in male newborn. (Figure 1). The difference by statistical analysis was highly significant ($P < 0.001$). Nearly the same difference was found between both sexes in ultrasound examination i.e. 13.5% in female and 7.3% in males. This was once again highly significant ($P < 0.001$). The incidence of abnormal clinical examination was higher in Saudi babies (4.2%) and 2.9% in non-Saudi, while for ultrasound screening, the incidence was slightly higher in Saudi babies 10.9% compared to 9.7% in non-Saudi (Figure 2).

DISCUSSION :

Hip sonography, according to Graf's, is 20 years old. The methodology must be strictly adhered to in order to get reproducible results at the highest possible level of perfection .

The clinical evaluation of the stability of the hip by experienced examiners at some centers have succeeded in detecting most cases of DDH ^(6,7,8,9) . The high level of training makes it difficult for others to believe that missed cases of DDH can be abolished by such screening. ^(10,11,12) Some authors ⁽¹³⁾ agree on this technique while others do not ⁽¹⁴⁾ .

The incidence of clinically detected hip instability DDH was found to be 3.5% out of the 1618 hips studied. Nationality plays a role for positive clinical findings. Sixty percent of the positive hips were Saudi compared to 40% non-Saudi (Figure 3A). On clinical examination, limited abduction or positive ortalani, a significant difference between both sexes was observed. Almost 77% of the positive hips belonged to female while only 23% to male newborn (Figure 4A).

The overall incidence of DDH in the study by ultrasound screening was (10.3%) that included Ila hips which usually normalized with age. If we omit all babies with Ila-type hips, the incidence drops to 3.3%. A study from Italy⁽¹⁵⁾ estimated incidence as 2% but they considered Ila as physiologically borderline immature hips by ultrasound. There is not much difference between Saudi and non-Saudi as 54% of positive hips belonged to Saudi while 46% to non-Saudi (Figure 3B). There is a significant difference

between girls and boys in ultrasound findings. Sixty-four percent (64%) of all abnormal hips from the ultrasound presented in girls compared to only 36% in boys (Figure 4B).

As expected ultrasound and clinical findings were correlated in 89.6% and opposed in 10.4% (Figure 5).

Epidemiological studies showed that DDH incidence shows racial variation with an increased incidence in native American population, while low incidence in Korean, Chinese and black ⁽¹⁶⁾ .

Thus, the high incidence of DDH in the present studied sample, compared to those previously done elsewhere (Table 1), was difficult to be correlated due to the non-homogenous distribution of such a population. The literature showed high incidence in Poland (6.8%) ⁽¹⁷⁾ , Austria (6.57%) ⁽¹⁸⁾ , Singapore (6.5%) ⁽¹⁹⁾ , and Belgium (5%)⁽²⁰⁾ . A study from Ethiopia showed very low incidence among black Ethiopian babies 0.44% while the incidence rose to 5.9% in white babies born in Ethiopia. This highlighted the role of race and nationality ⁽²¹⁾ . Lower incidence of DDH were estimated in Haifa (3.96%) ⁽²²⁾ , Italy (2.8%)⁽²³⁾ , and Hungaria (2.5%) ⁽²⁴⁾ . Unusually low incidence of DDH was noticed in Japan (1.1%) ⁽⁴⁾ and South Australia (1.05%) ⁽²⁵⁾ . These variations in the incidence of DDH cannot be explained at the moment with regard to the environment.

CONCLUSION :

The possible explanation of higher incidence of DDH in KAUH in Jeddah might be due to:

- Early screening of babies (in the first 24 hours) where the effect of maternal relaxin hormone may still be operating giving focal ligament laxity⁽⁸⁻²⁶⁾ .
- Most of the ultrasound abnormalities were type IIa- (67.8%) that would usually normalize spontaneously by 6-8 weeks⁽²⁷⁾, as they mature.
- The high incidence (10.3%) is presumably due to the traditional methods of child care with both hips and knees are extended⁽⁴⁾. It is recommended to improve child care methods in order to prevent the postnatal development of hip dislocation. Prolonged extension of the hips and knee in adducted position during early postnatal weeks (picture 2) should be avoided. Therefore, ultrasound of the neonatal hip must be set in the general screening program for the newborn.

The optimal time for sonographic screening doesn't seem to be immediately necessary after birth except for those in the high risk group. The ideal time would be between 4-6 weeks when the hips have already shown their true nature^(28,29) .

REFERENCES :

1. Graf. Classification of hip joint dysplasia by means of sonography. Arch Orth Trauma Surgery 1984;102: 248-55.
2. Moria C, Harcke HT, MacEwen GD. The infant hip: real time ultrasonound assessment of acetabular development. Radiology 1985;157: 673-7.
3. Niethard , Roesler . Die Genauigkeit von Längen – und Winkel-Messungen Im Rontgenbild und sonogramm des Kindlichen Huftgelenkes. Z Orthop 1987;125: 170-6 (Eng-Abst).
4. Suzuki S. Ultrasonography of CDH via an anterior approach. Pediatrika, Madrid 1993: 56-76.
5. Harcke HT, Grissom LE. Performing dynamic sonographic of the infant hip. AJR 1990;155: 837-844.
6. Barlow TG. Early diagnosis and treatment of congenital dislocation of the hip. J. Bone Joint Surg [Br] 1962; 44-B: 292-301.
7. Mitchell G.P. Problems in the early diagnosis and management of Congenital dislocation of the hip J. Bone Joint Surg [Br] 1972; 54-B: 4-12.
8. Fredensborg N. The effect of early diagnosis of congenital dislocation of the hip. Act Paediatr Scan 1976; 65: 323-8.
9. Ortolani M. The classic congenital hip dysplasia in the light of early and very early diagnosis. Clin Orthop 1976; 119: 6-10.

10. Morrissy RT, Cowie GH. Congenital dislocation of the hips: Early detection and prevention of late complication. *Clin Orth* 1987; 222: 79-84.
11. MacAuley S, McManus . Congenital dislocation of the hip the problem of late diagnosis. *J. Fr. Med Assoc* 1973; 66: 558-62.
12. Bjerkreim . Congenital Dislocation of the hip joint in Norway. *Acta orthop Scand* 1974; Supp 157.
13. Rosendahl K, Markestad T, Lie RT. Developmental dysplasia of the hip. A population-based comparison of ultrasound and clinical findings. *Acta-Paediatr* 1996 Jan;85(1): 64-9.
14. Joseph KN, Meyer S. Discrepancies in ultrasonography of the infant hip. *J Pediatr Orthop B* 1996 Fall; 5(4): 273-8.
15. Bailerini G, Avanzini A, Colombo T. Neonatal screening and follow up of congenital hip luxation using ecography. *Radiology- Med Torino* 1990 Dec.; 80 (6): 814-7.
16. Novacheck TF. Developmental dysplasia of the hip. *Paediatric Clinic of North American* 1996 Aug;43(4): 829-848.
17. Grill F, Muller D. Results of hip ultra sonographic screening in Austria. *Orthopade* 1997 Jan; 26(1): 25-32.
18. Ortore P, Fodor G, Silverio R, Milani C, Psenner K. Ultrasography of the neonatal hip state of art and perspectives. *Radiol- Med-Torino* 1996 July – Aug; 92(1-2):10-5.
19. Bialik V, Berant M. Immunity of Ethiopian to developmental dysplasia of the hip a preliminary sonographic study. *J Pediatrik Ortho [B]* 1997 Oct;6(4):253-9.

20. Ulveczki E. Ultrasonic screening for congenital hip dysplasia. *Orv-Hetil* 1992 June 14; 133(24): 1481-3.
21. Szulc W. The frequency of occurrence of congenital dysplasia of the hip in Poland. *Clin-Orth* 1991; Nov (272): 100-2.
22. Schauner C. Earliest diagnosis of congenital dislocation of the hip by ultrasonography. Historical background and present state of Graf's method. *Acta Orthop – Belg –* 1990; 56(1): 65-77.
23. Ang KC, Lee EH, Lee PY, Tan KL. An epidemiological study of developmental dysplasia of the hip in infants in Singapore. *Ann-Acad-Med-Singapore* 1997 Jul;26(4): 456-8.
24. Yiv BC, Saidin R, Cundy PJ, Tgetgel JD. Development dysplasia of the hip in South Australia in 1991. Prevalence and risk factor. *J-Pediatric Chil-Health* 1997 Apr; 33(2): 151-6.
25. Bialik V, Wiener F, Blazer S, Katzir J, Sujov P. Clinical effectiveness of neonatal ultrasonographic screening for developmental dysplasia of the hip. *Pediatrics* 1993: 108-112.
26. MacLennan AH, MacLennan SC. Symptom-giving pelvic girdle relaxation of pregnancy, postnatal pelvic joint syndrome and developmental dysplasia of the hip. *Acta-Obstet-Gynecol-Scan* 1997 Sep;76(8): 760-4.
27. Stover B, Bragelmann R, Walther A, Ball F. Development of late congenital hip dysplasia. Significance of ultrasound screening. *Pediatr-Radiol* 1993;23(1): 19-22.

28. Theodore H, Haecke MD. Dynamic sonography of the infant hip. Philadelphia 1993.
Pediatric Madrid: 36-42.
29. Marks DS, Clegg J, Al-Chalabi AN. Routine ultrasound screening for neonatal hip instability, can it abolish late presenting congenital dislocation of the hip. J Bone Joint-Surg-Br 1994 Jul;76(4): 534-8.

Figure 1

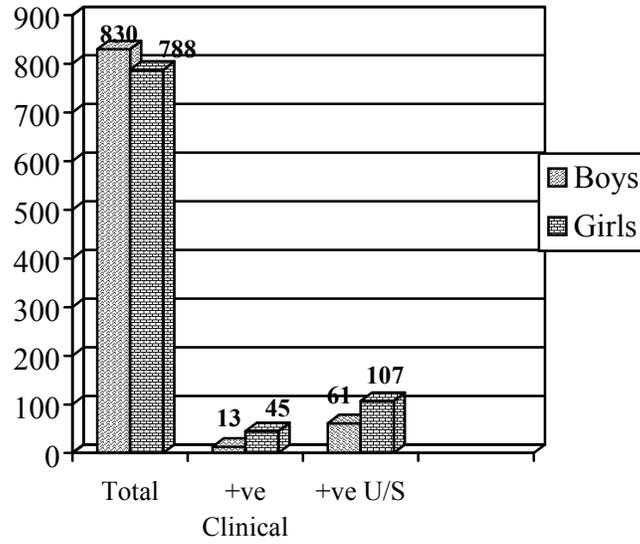


Figure 2

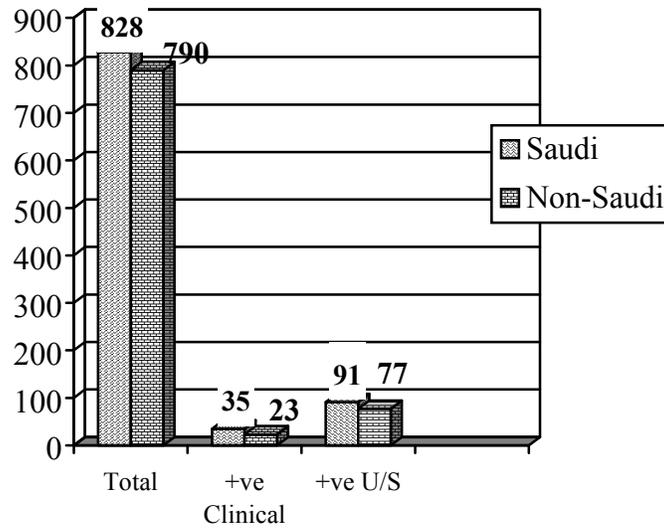
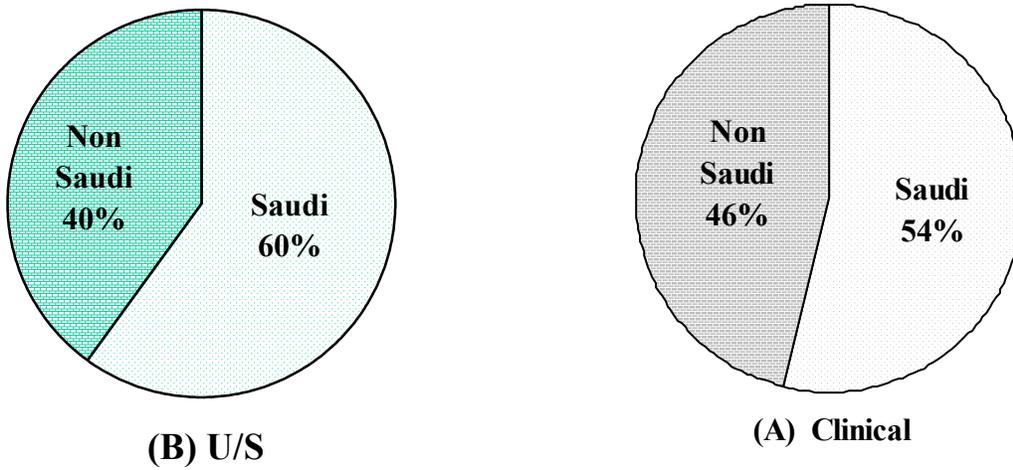
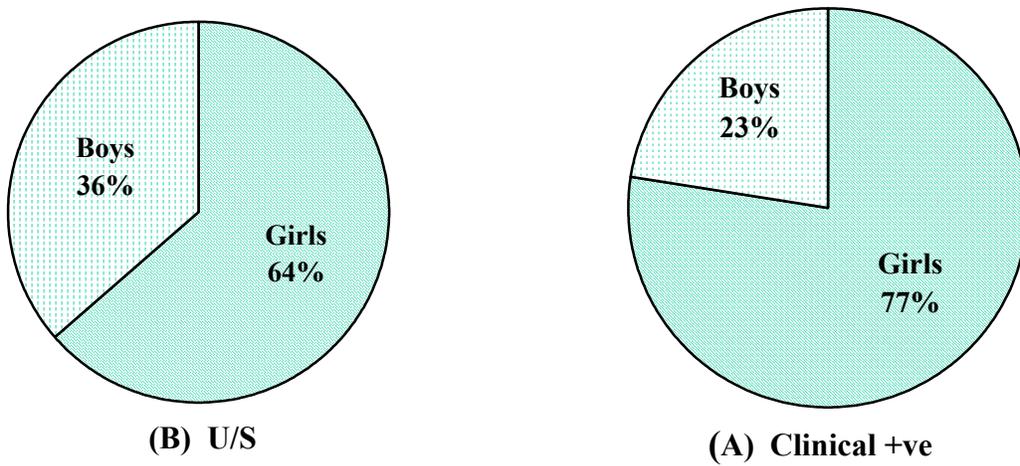


Figure 3



Percentage of Saudi / Non-Saudi in both clinical and ultrasound findings

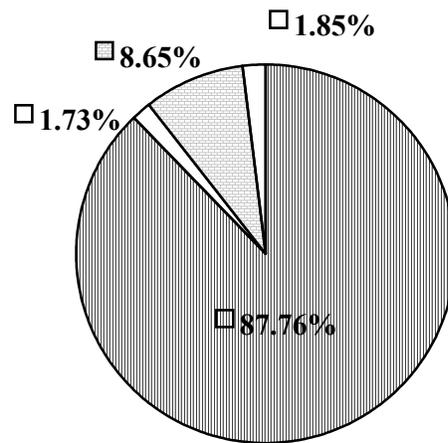
Figure 4



Percentage of Boys / Girls in both clinical and ultrasound findings

Figure 5

The groups of hips according to ultrasound pathology and clinical instability



- Clinical and Ultrasound Normal (87.76%)
- Clinically Unstable but Ultrasound Normal (1.73%)
- ▨ Clinical Stable with Ultrasound Pathology (8.65%)
- Clinically and Ultrasonography Abnormal (1.85%)

Table 1

Country	Years of study	Incidence	Reference No.
Japan	1980	1.1%	4
Poland	1991	6.8%	17
Austria	1994	6.57%	18
Singapore	1997	6.5%	19
Belgium	1990	5%	20
White Ethiopian	1997	5.9%	21
Black Ethiopian	1997	0.44%	21
Haifa	1992	3.96%	22
Italy	1990	2.8%	23
Hungaria	1992	2.5%	24
South Australia	1991	1.05%	25
Saudi Arabia	1995	10.3%	