

# The Morphology of DDH in Saudi Children in Riyadh, KAMC

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## Abstract

**Objectives:** The overall aim of this research project is to evaluate the morphology of DDH in The Kingdom of Saudi Arabia.

**Background:** DDH is one of the commonest presentations in pediatric orthopedic worldwide. It is defined as "Developmental dysplasia of the hip which represents a spectrum of anatomic abnormalities in which the femoral head and the acetabulum are in improper alignment and/or grow abnormally. DDH was termed as congenital dysplasia of the hip but it is found that the disease is not really a birth related. The incidence of DDH varies between 1.5 and 20 per 1000 births due to a various factors. These factors include diagnostic criteria, gender, genetic and racial factors, and age of the population in question. The presentation of the disease depends on the age, the severity, the site, the duration and many other factors.

**Methods:** This is a retrospective hospital based clinically reviewed research in which data collected and analyzed in king Abdul Aziz medical city in Riyadh, Saudi Arabia (KAMC-R) which is a 1000-bed specialized health care institution that covers a wide range of secondary and tertiary care specialties. All Saudi and non-Saudi consecutive male and female patients who were diagnosed with DDH and underwent surgical management since birth up to the age of 14 at KAMC-R were eligible study candidates from July 2007 to July 2014.

**Results:** Results show among 136 patients who underwent surgical intervention for DDH correction, 106 of them (77.9%) were female. Negative family history was shown in 91 patients (66.9%) and Primigravida were in 18 patients only (13.2%). Vertex presentation during delivery was shown in 69 (71.1%) patient and 108 patients were term (80%). Average Weight of those patients after delivery was 3.12±0.05 and average age of their mothers was 29.5±0.7. The common sides affected by DDH were bilateral (77), left (32) and right (27), respectively. Close reduction was surgery approach for 90 patients (69.8%) while open reduction and pelvic osteotomy were in 26 (20.2%). Also, femoral shortening was approached in 13 patients (10%); Common complications for surgical intervention were limping (33), stiffness (26), redislocation (5) avascular necrosis (5), respectively.

**Keywords:** DDH; CHD; Children; Pediatrics; Morphology; Risk factors

## Introduction

DDH is one of the commonest presentations in pediatric orthopedic worldwide. It is defined as "Developmental dysplasia of the hip which represents a spectrum of anatomic abnormalities in which the femoral head and the acetabulum are in improper alignment and/or grow abnormally [1]. DDH was termed as congenital dysplasia of the hip but it is found that the disease is not really a birth related [2]; the incidence of DDH varies between 1.5 and 20 per 1000 births due to a various factors. These factors include diagnostic criteria, gender, genetic and racial factors, and age of the population in question [3,4]. If we take the racial factor as an example we will found that DDH is less frequently affects African Americans than Caucasian Americans [5].

DDH severity ranges from joint laxity and mild subluxation to fixed dislocation [5]. There are five types of DDH which are: maldirected acetabulum, capacious acetabulum, false acetabulum, lateralized acetabulum, and femoral deformity [6].

Regarding the etiology of DDH, there is no agreement in etiological factors but there are risk factors that might contribute in the pathogenesis of DDH. The most common factors are family history, breech presentation, estrogen, female gender [5,7-9].

The etiology of DDH is controversial but one of the most reliable theories suggests that mechanical factors affect the position in uterus in which expulsion of the head upward and backward caused by an abnormal pressure on the greater trochanter due to hyperflexion with adduction and external rotation [10].

Regarding the screening of DDH, physician should do Physical examination for all newborns and they should be re-examined again during well baby clinic visits until 1 year of age because negative results cannot exclude the chance of having DDH 100% [2]. The examination includes Ortolani and Barlow maneuvers in neonates and limited abduction sign in older children [5]. If any suspicion arises, physician should use Ultrasonography which is sensitive tool for children from birth to 4 months of age but not before 2 weeks. And if the child is older than 4 months of age, an antero-posterior pelvis radiograph can be used to confirm diagnosis [2,5,11].

The treatment of patients with DDH is well known to have high efficacy Also, It is well known that the treatment of DDH is age dependant. In fact there are two general categories of the treatment. In early presentation (less than 6 months) non surgical methods like Pavlik harness which is a device that keeps that hip in abducted and flexed position in order to stabilize

the hip is indicated while in patients older than that surgical methods are indicated [12]. There are two types of surgeries done in DDH the first one is the open reduction and the second one is the closed reduction also, the choice between these methods is age dependant [13]. The surgery is usually accompanied by braces and splints to give the maximum benefits from the surgery [12,13].

In study that was conducted in King Khalid University Hospital, Riyadh, Kingdom of Saudi Arabia in 2003 they found that consanguinity, family history and breech deliveries are the most common factors behind DDH in KSA, Also they raised the need of national screening program [14]. Since DDH is a common presentation in KSA it is important to assess the efficacy of the method used for screening of DDH. The factors that influence the efficacy of any screening tool are the sensitivity then the specificity respectively so we will challenge the screening modalities that are done in neonatology department in KAMC via prospective study looking for false negative and false positive patients by comparing the number of patients diagnosed in nursery and how accurate is their diagnoses and the number who passed the nursery then diagnosed lately.

### Methodology

This is a retrospective hospital based clinically reviewed research in which data collected and analyzed in king Abdul Aziz medical city in Riyadh, Saudi Arabia (KAMC-R) which is a 1000-bed specialized health care institution that covers a wide range of secondary and tertiary care specialties. All Saudi and non-Saudi consecutive male and female patients who were diagnosed with DDH and underwent surgical management since birth up to the age of 14 at KAMC-R were eligible study candidates from July 2007 to July 2014. Regarding the open reduction type of intervention, all patients are managed with pemberton approach done by Dr. Mazen Alhunaishel .The main resources we utilized were the medical records. We reviewed all the files for the DDH patient and their mothers' files during pregnancy period as possible. All data were collected, sorted, filtered, cleaned and merged together with special reference to the index admission date. Data was collected by the co-investigator. Relevant variables (examples: age, gender, date of birth, family history, complications, etc.) for eligible patients were extracted from their respective clinical sources (soft and hard copy medical records and electronic databases). All variables were entered into SPSS for further data management and analysis. Study variables will include evaluation of demographic characteristics, risk factors and complications of DDH. Relevant study variables were determined and coded, as per data collection sheet. Variable values were collected from electronic and hard copy patient data sources. Values were entered into IBM SPSS software. Upon completion of data collection, they were entered, reviewed, cleaned, processed and analyzed. Continuous variables were expressed as mean +/- standard deviations. Categorical variables will be presented as frequencies and percentages (%).

### Results

Among 136 patients whom underwent surgical intervention for DDH correction, 106 of them (77.9%) were female and 30 patients (22.1%) were male (table 1). They showed normal birth weight with mean 3.12 ( ± 0.06) (table 1). Family history was positive in 17 patients (12.5%) while others were negative. Full term of pregnancy were shown in 126 patients (92.7%) while preterm and post term pregnancy were shown in 9 patients (7.5%) and one patient (0.9%), respectively (table 1). 110 patients (80.8%) were delivered normally while the others had C-section delivery (19.2%). Vertex mode in fetal presentation was in 121 patients (89%) while breech presentation were with 15 patients (11%) (table 1) others of those patients have an average age of 29.48 ( ± 0.7). Common sides of hip affected by DDH were bilateral (77), left (32) and right (27), respectively (table 1). Commonest complication of surgical intervention were limping in 33

| Demographic Characteristic | Category        | Statistics  |
|----------------------------|-----------------|-------------|
| Gender                     | Male            | (30) 22.1%  |
|                            | Female          | (106) 77.9% |
| Term                       | preterm         | (9) 6.6%    |
|                            | term            | (126) 92.7% |
|                            | Post-term       | (1) 0.7%    |
| Family Hx                  | negative        | (119) 87.5% |
|                            | positive        | (17) 12.5%  |
| Site of DDH                | Left            | (32) 23.5%  |
|                            | Right           | (27) 19.9%  |
| Mode of Presentation N (%) | Vertex          | (121) 89%   |
|                            | Breech          | (15) 11%    |
| mode of delivery           | Normal delivery | (110) 80.8% |
|                            | C section       | (26) 19.2%  |
| Maternal Age               |                 | 29.48 ± 0.7 |
| Birth Weight               |                 | 3.12 ± 0.06 |

Table 1: Demographic Characteristic

| Complications | Statistics  |
|---------------|-------------|
| Limping       | (33) 24. 3% |
| Avascular     | (3) 2.2%    |
| Stiffness     | (26) 19.1%  |

Table 2: Complications

patients which was followed by stiffness in 26 patients. Also, 3 patients were affected by avascular necrosis of femoral head (table 2).

### Discussion

Most of the results in our study show consistency with what is written in the literature in previous studies. As a matter of fact many variables include gender, term, mode of presentation and stiffness follow the pattern of data in literature [14-17]. Regarding the site of the diseases it is well accepted that the left hip involvement in DDH predominates right and bilateral involvements. Kremli MK et al. in their study described an incidence of 37.1% for left involvement [14]. The result of our study shows a dominance of bilateral involvement (56.6%). Avascular necrosis (AVN) is the most serious complication and has been reported in different studies with an incidence between 0-3% [18,19]. The found rate of AVN in our study, 2.2%, which is within the acceptable range internationally. Temporary limping after operation is known as the most common complication of surgical management of DDH with an overall rate reach up to 55.3% like the study done Mirdad T, in Aseer [17]. In our study limping still the commonest complication but with lower rates because it is seen only in 24.3%. Family history is another variable that show significant difference from our study and other local study compare to the international data because of many factors like consanguineous marriages. In general the family history is positive in a range from 0.9% up to 4.4% of cases depends on many factors while in our study the overall of positive family history is 12.5% and in the study done by Mirdad T, in Aseer the positive results are 21.3% [4,17] regarding the mode of delivery it is found that 19.2% of the patients were a products of cesarean section while in the study done

by Mirdad T, in Aseer the rate was 9.3% [17] the average weight at birth in our study is  $3.12 \pm 0.06$  Kg while in Sionek A et al. in Warsaw the average birth weight shows low birth weight with 2.402 Kg [20].

## Conclusion

DDH is one of the most common pediatric orthopedic diseases in children with high occurrence rate. Early detection is important to decrease the need of surgical interventions which associated with high complication rates as clarified in this research and other researches in the literature. A national screening program is highly recommended for early detection. DDH screening program should include a careful history to clarify the risk factors in order to sort the subject to high risk group and low risk group followed with careful physical examination using the well known tactics to detect DDH. Ultrasonography is a well known radiological method used for early detection of DDH and it is safe, cheap and widely available method. Further testing includes risk factors assessment, radiological parameters evaluation and patient's family appraisal should be considered to have better understanding for the patterns of DDH in Saudi Arabia in compare to regional and international data.

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