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Developmental Dysplasia of the Hip in Abha-Saudi Arabia. Incidence, and Risk Factors

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ABSTRACT

Developmental dysplasia of the hip (DDH) is a disease ranging from mild acetabular dysplasia to frank dislocation. When a child is older than 6 months, getting them to have a hip that is smaller in the middle and doesn't cause too many problems is harder. In this study, the medical records of all 340 children with DDH in Abha Maternity and Children Hospital, Abha, Saudi Arabia were evaluated to find out how often DDH is diagnosed and treated there and what are the main risk factors related to its presentation and management.

About 36.2% (123) of the children had a family history of DDH, and 38.5% (131) of their parents were married consanguineously. 48% of the parents used "limping" and 14% used "limitation in abduction" (LA) as presenting complaints to the clinic. The results showed a strong link between early age, being male, having a family history of DDH, having pregnancy complications, and being preterm (with a p-value of less than 0.000).

Keywords: Developmental dysplasia of the hip - DDH - Hips - Children - Saudi Arabia.

INTRODUCTION

The term "developmental dysplasia or dislocation of the hip" (DDH) refers to the complete spectrum of abnormalities involving the growing hip, with varied expressions from dysplasia and subluxation to dislocation of the hip joint, which is used to describe structural abnormalities that can arise in the developing hip in children and newborns. (Guille *et al*., 2000). However, the term does point to the main cause of DDH development (Imrie *et al*., 2010)

Dislocated hips at birth occur at a rate of 1:1000 -5:1000; subluxation and dysplasia at a rate of 10:1000; and when universal ultrasound screening is in place, at a rate of 25-50:1000, we must devote greater attention and resources to detecting and treating DDH. This is more common in some societies in developing countries since this is how infants are still swaddled: with their legs completely extended and wrapped together (van Sleuwen *et al*., 2007). After switching from traditional swaddling to "safe swaddling," the rate of dysplasia among Native American children went from six times the US average to the same rate as the rest of the US population (Orak *et al*., 2015). Legs that can bend and extend naturally without restricted hips have been demonstrated to lessen the likelihood of getting DDH (de Hundt *et al*., 2012).

The incidence of DDH among children is still relatively moderate to low, and more common in female children than males, as the rate was 4.1% per 1,000 males and 19.2% per 1,000 girls. With a positive family history, the risk increases of 1.7 (6.4 per 1,000 boys and 32 per 1,000 girls) (Goiano *et al.*, 2020).

The incidence and occurrence of DDH can be ascribed to various risk factors. The relaxin hormone, found in the blood of 80% of affected mothers, is suspected of playing a role in the increased ligament laxity observed in their offspring. The left side is more common than the right and is found to be 80% of cases. Hip abduction is more limited on the left side in non-breech infants due to the natural position of the hips after birth, which is adducted against the mother's spine (Kural *et al*., 2019).

DDH risk factors include positive family history, joint laxity, breech presentation, being a firstborn, having oligohydramnios, swaddling the newborn, being female, being of a certain ethnicity, and having certain orthopedic conditions in infants, such as torticollis or foot deformities (Ulziibat *et al*., 2021).

During the first six months of life, hip ultrasonography is now the most common method of determining if a child has DDH. There is a higher likelihood that a brace will not be effective in treating DDH if an ultrasound reveals that the baby's hips are dislocated. Therefore, the efficacy of conservative treatment is significantly affected by the initial ultrasonographic finding of hip dysplasia (De Hundt *et al*., 2012).

Numerous studies have examined the link between DDH and potential risk factors, and for a long time, researchers' findings have varied. Despite widespread agreement that multiple variables contribute to DDH, the disorder's precise causes remain unknown due to inconsistencies in patient data and research approaches. There is also a lack of research on how DDH risk factors relate to the ultrasonographic subtype of hip disease.

Radiological procedures such as X-ray, computed tomography (CT), magnetic resonance imaging (MRI), and ultrasound are all used to diagnose DDH and monitor its progress throughout treatment (Murray and Crim, 2001).

There are many books and electronic ways that cover this disease for raising a family and the to manage this complication, and parents must be aware of the risks and consequences that may arise if they ignore their child's DDH without seeking care and treatment as soon as possible, especially in our country. Early detection and treatment are crucial for a child's long-term prognosis. Still, our community's lack of awareness of DDH is due to many causes, including a lack of campaigns and parents who are uninformed of how their child's hip dysplasia can seem. Researchers reached that conclusion (Alshahrani *et al*., 2018).

Finally, various structural abnormalities can appear in the developing hip, making diagnosis and treatment challenging. However, early detection and treatment can only attain the optimal functional outcome. Hip dysplasia that persists throughout adolescence or adulthood can hasten the development of degenerative hip and knee joint disease. Despite best efforts to diagnose and treat all cases of DDH immediately following birth, some children's diagnoses are delayed, and their outcomes worsen over time; this is what prompted us to raise awareness of the problem and encourage parents to take preventative measures to ensure their children do not suffer from structural and bone deformities due to neglect (Kotlarsky *et al*., 2015). Therefore, this study aimed to assess the incidence of DDH cases and related risk factors among children in Abha Maternity and Children Hospital.

Methodology

The study was conducted in Abha, this retrospective observational study was performed by reviewing patient medical records in Abha maternity and children hospital over a period from 2018 to 2021 with a total number of patients 340 cases. The data was collected in a data collection sheet with multiple variables including age, gender, family history, presenting complaints, mode of delivery, and diagnostic tools. Then all data were entered in an excel sheet

Statistical methods:

The validity and predictability of the data collected from the medical record of patients' files were measured and entered in an Excel sheet and then statistically analyzed using Statistical Package for Social Science (SPSS) version 25. Descriptive statistics were obtained to get the mean, standard deviation, and frequency tables. Inferential statistics were conducted using the Chi-square test.

Ethical approval was obtained with IRB log no. REC-07-02-2022 at the year 2022 from the Asser International Review Board of the Ministry of Health in Saudi Arabia. Patients' confidentiality was kept without personal data referring to or implying the participants' identity. All of the patients included in the study were anonymous.

RESULTS

Of a total of 340children with DDH, more than 99% were Saudi in their nationality (figure), around 36.2% (123) had a family history of DDH (figure),

and 38.5% (131) of the total child's parents were already marrying consanguinity status (figure).

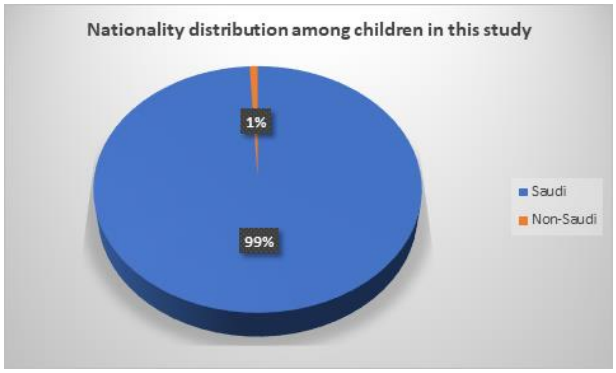

Figure 1 Nationality distribution in this study

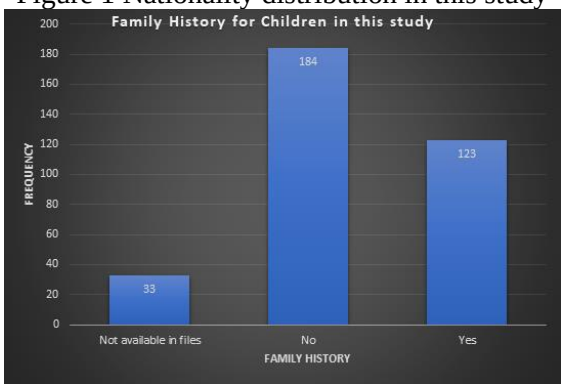

Figure 2 Family history for DDH children in this study

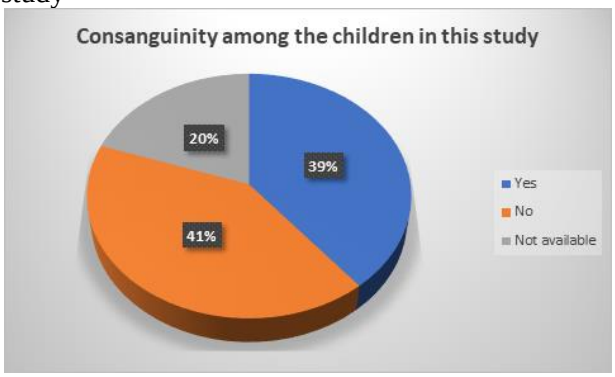

Figure 3 Probability of consanguinity between parents of DDH child

The most predominant age group was 11-20 months old (135), and the least age group was 51-60 months old (11); the female gender was predominant (281), and only one child was obeyed for gestation was prevalent (312), the normal spontaneous vaginal (NSVD) was more prevalent as a way of infantile delivery (193), about 144 of a child were delivered as cephalic, only 44 of total mothers had pregnancy complications, and about 300 of a child were born in a full-term gestation status.

Table 1 Demographic data in this study DDH cases

Variable	Frequency (n=340)
Age	
1-10	43
11-20	135
21-30	57
31-40	42
41-50	22
51-60	11
>60	24
Not available in files	6
Gender	
Female	281
Male	59
Number of gestations	
N/A	23
One	312
Twin	5
Mode of Delivery	
NSVD	193
C\S	114
Not available in files	92
If NSVD	
Breach	23
Cephalic	144
Not available in files	23
Pregnancy complications	
Yes	44
No	253
Not available in files	53
Gestation	
Full-term	300
Preterm	40

Clinical presentation for DDH was diverse; the majority used limping (164) and Limited abduction (LA) (48), while using more than one way of diagnosis, such as LA & Limping, was relatively high (21) (table).

Table 2 Clinical presentation for DDH cases in this study

Clinical Presentation	**Frequency**
At birth	2
Limping + LLD	3
by X-ray	1
Family Hx	7
LA	48
LA + limping	21
LA+ Limping + Referral	2
LA+LLD	1
Late walking	1
Laxity	1
LF + LA + Limping	1
limping	164
LIMPING + FAMILY History	3
No sitting	1
Referral	5
limping + LA	31

Limping + Referral	2
LLD	5

Several types of complaints were recorded for these children in the study; limping and LA were the most abundant complins (177 & 134), while Barlow and Ortolani were the last ones (14&7) (table)

Figure 4 Types of complaints about DDH children in this study

Complain	Frequency	Percentage (%)
Galeazzi		
Yes	81	
No	11	
Limping		
Yes	177	
No	11	
Barlow		
Yes	14	
No	2	
Limitation in abduction		
Yes	134	
No	18	
Ortolani		
Yes	7	
No	2	

The results showed a significant correlation between early aging, male gender, being with a family history of DDH, presence of pregnancy complications, preterm gestation status and incidence of limping and limitation in abduction (with p value less than (0.000) and also, the incidence of normal spontaneous vaginal delivery (NSVD), frequent gestation (twin and more) and limping and limitation in abduction (with p-value 0.002) (table 3).

Table 3 The level of significance and correlation between study variables and Dh incidence in this study

Variables	Significance (*p* value)
Age & limitation in abduction	**0.000**
Age &limping	
Gender & limitation in abduction	
Gender & limping	
Consanguinity & limitation in abduction	
Consanguinity & limping	
Family history & limitation in abduction	
Family history & limping	
Gestation & limitation in abduction	
Gestation history & limping	
Pregnancy complications & Limitations in abduction	**0.002**
Pregnancy Complications & limping	
Mode of delivery & limitation in abduction	
Mode of delivery & limping	
if normal spontaneous vaginal delivery (NSVD) & limitation in abduction	
If NSVD & limping	
Number of gestations & limitations in abduction	
Number of gestations & limping	

DISCUSSION

The medical term for what was once known as congenital dislocation of the hip is now known as developmental dysplasia of the hip (DDH). This shift has happened since it is now known that some infants will have a normal hip examination at birth

but develop hip illness during the first year of life (Bauchner, 2000) and that this bone deformity may cause significant impairment if not treated early. Understanding the importance of parental education in preventing the worsening of DDH and providing an early diagnostic and treatment program for children (Sadat-Ali, 2020).

From a total of 340children with DDH, and the female gender was predominant (281), more than 99% were Saudi in their nationality, around 36.2% (123) had a family history of DDH; this percentage referred to the remarked increased incidence of children with DDH in the e country, which is agreed with Loder and Skopelja study (2011) who reported that gender and family history are main risk factors (unmodifiable) for exaggerating and contributing in DDH incidence.

In this study, the male gender has more eligibility to get DDH than females, in contrast to Pulik *et al*. (2022), who found that Female sex: girls were <0.001 7.24 (4.39–11.95). About 38.5% (131) of the total child's parents were already marrying consanguinity status. The results showed a significant correlation between early aging, male gender, being with a family history of DDH, presence of pregnancy complications, preterm gestation status and incidence of limping and limitation in abduction (with p value less than (0.000) and also, the incidence of normal spontaneous vaginal delivery (NSVD), frequent gestation (twin and more) and limping and limitation in abduction (with p-value 0.002). The most predominant age group was 11-20 months old (135), and the least was 51-60 months old (11). Only one child was obeyed for gestation was prevalent (312), the normal spontaneous vaginal (NSVD) was more prevalent as way of infantile delivery (193), about 144 of child were delivered as cephalic, and only 44 of total mothers had pregnancy complications. About 300 of a child were born in a full-term gestation status, which is in agreement with Woodacre *et al*. (2016) study, which also concluded that The odds ratio (OR) for developing DDH was shown to be 24.3 when a breech presentation was present. It was 15.9 when DDH ran in the family.

Although the number of infants born in positions other than cephalic or breech was modest, the odds ratio (OR) of 5.0 was statistically significant (p 0.027). The greater crude OR for cesarean section was likely since vaginal delivery with breech newborns is more likely to be delivered by cesarean section. Once this bias was accounted for, cesarean section was found to be protective, while vaginal delivery increased the risk by an odds ratio (OR) of 2.7. Additionally, the risk of DDH decreased with increasing parity, with first and second-born children having an OR (adjusted for birth order) of 1.8 compared to third and subsequent children.

Clinical presentations for DDH were diverse; the majority used limping (164) and Limited abduction (LA) (48), while using more than one way of diagnosis, such as LA & Limping, was relatively high (21). Several types of complaints were recorded for these children in the study; Limping and LA were the most abundant complins (177 & 134), while Barlow and Ortolani were the last ones (14&7); these findings are about Dygut *et al*. (2022) study who reported that the asymmetry (limited) in the hip joints' abduction and limping are main clinical presentation procedures for early and also late DDH.

CONCLUSION AND RECOMMENDATIONS

The ultrasonographic type of hip pathology in DDH newborns has not been documented previously and is associated with DDH in the group of screened infants in this investigation. The findings of this study may improve current neonatal hip screening practices. If we want to discover DDH early and limit the number of people who need surgery, we should examine the hips of all babies. 22 However, selective neonatal hip screening is still practiced in many regions worldwide. When a newborn has even one risk factor for DDH, the likelihood of developing the condition increases dramatically; when they have multiple risk factors, the likelihood increases even further. Since this is the case, newborns with multiple risk factors may need extra attention from selected neonatal hip screening programs. The two most common reasons for DDH are genetics and the practice of swaddling newborns. As a bonus, these two characteristics are also associated with a higher chance of brace treatment failure in DDH due to the development of sonographically more severe hip dysplasia (Graf types D, III, and IV hips). Additionally, breech presentation increases the likelihood of DDH, and oligohydramnios increases the likelihood of hip dysplasia with Graf types D, III, or IV in patients with DDH. We propose that screening programs for hip issues in infants expand to include the four causes outlined above as "absolute risk factors." To increase the sensitivity and specificity and decrease the chance of a late diagnosis, it seems evident that infants with at least one of these four key risk factors should be sent for an ultrasonographic hip test as part of selected newborn hip screening programs.

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