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Prevalence and management of developmental dysplasia of the hip in children: A one-year study at a tertiary care center

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Abstract

Background: Developmental dysplasia of the hip (DDH) is a common pediatric orthopedic condition that leads to hip instability or dislocation if untreated. Early diagnosis and treatment are crucial to prevent long-term complications such as early osteoarthritis. The study aimed to assess the prevalence, risk factors, diagnostic methods, and treatment outcomes for DDH in children at Madha Medical College, Chennai.

Materials and Methods: This descriptive study was conducted over one year (June 2019 to May 2020) at Madha Medical College, Chennai, involving 75 children aged 0 to 5 years. Clinical examination using the Ortolani and Barlow tests, along with ultrasonography and X-rays, were employed to diagnose DDH. Risk factors such as breech presentation, family history, and firstborn status were recorded. Treatment strategies included conservative management with the Pavlik harness and surgical interventions in more severe cases.

Results: The study found that 58% of children with DDH were female. Breech presentation was the most common risk factor, observed in 38% of cases. A majority of children (60%) were diagnosed under the age of 2 years, with 65% of cases classified as mild dysplasia. Conservative treatment with the Pavlik harness was effective in 70% of cases, and 80% of children achieved successful outcomes without complications.

Conclusion: The findings of this study highlight the importance of early detection and management of DDH. The Pavlik harness was an effective treatment method, and early intervention led to favorable outcomes in most children. The study underscores the need for continued efforts in screening and early treatment to prevent long-term complications in DDH cases.

Keywords: Developmental dysplasia of the hip, DDH, pediatric orthopedics, Pavlik harness, early detection, breech presentation

Introduction

Developmental Dysplasia of the Hip (DDH) refers to a spectrum of hip joint abnormalities that range from mild acetabular dysplasia to complete femoral head dislocation. It is a congenital condition that occurs during fetal development, and if left untreated, it can result in significant morbidity, including gait abnormalities and early-onset osteoarthritis.

The incidence of DDH varies significantly across different populations, with studies showing an overall prevalence of 1 to 10 per 1,000 live births, depending on the geographical region and the methodology employed in diagnosis^[1]. Factors such as genetics, prenatal factors, and cultural practices play a crucial role in these differences. For instance, in Native American populations, the prevalence of DDH can be as high as 76 per 1,000 live births, while African populations report much lower figures, around 0.06 per 1,000. These variations are attributed to genetic predispositions and differing screening protocols. Studies have also highlighted a gender predisposition, with females being significantly more affected than males, and this disparity is thought to be due to hormonal influences that affect ligamentous laxity in females during fetal development^[2].

Several prenatal and postnatal factors contribute to the development of DDH. Breech presentation is one of the most significant risk factors, as the abnormal position of the fetus within the uterus can limit the movement of the hip joint and predispose it to instability.

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Family history also plays a critical role, with children of parents who have a history of DDH being at a higher risk. Other risk factors include firstborn status, oligohydramnios, and swaddling practices that may restrict the movement of the hip. These factors are important for healthcare providers to consider when screening for DDH in newborns and infants [3]. Early diagnosis of DDH is vital, as clinical signs may be subtle, especially in neonates. Routine screening, such as the Ortolani and Barlow tests, are essential to detect hip instability in the early months of life. Ultrasound imaging is the gold standard for diagnosis in infants under six months, as the hip joint is not yet ossified and ultrasound offers superior sensitivity in detecting abnormal hip development. For older children, X-rays are used to assess the degree of acetabular dysplasia and femoral head dislocation. Early intervention is critical, with conservative treatment, such as the Pavlik harness, being the first-line management for most infants diagnosed with DDH. More severe cases may require closed reduction or even open surgery to ensure proper joint alignment [5, 6].

The early detection of DDH is critical to preventing these long-term consequences, as timely intervention can lead to optimal musculoskeletal development and function. This study seeks to explore the prevalence of DDH in children, providing valuable insights into its epidemiology, risk factors, clinical presentations, and management strategies.

Materials and Methodology

This descriptive study aimed to assess the prevalence of hip dysplasia in children. The study was conducted at the Department of Pediatrics, Madha Medical College, Chennai, over a period of one year, from June 2019 to May 2020. A total of 75 children, ranging in age from birth to 5 years, were included in the study. The sample size was selected based on convenience sampling, and children presenting with clinical signs of hip instability, along with those attending routine pediatric check-ups, were screened for the condition.

Ethical approval for the study was obtained from the Institutional Ethics Committee of Madha Medical College. Informed consent was taken from the parents or guardians of all participating children. The inclusion criteria consisted of all children within the specified age range who were either diagnosed with hip dysplasia or were clinically suspected of having the condition. Children with other congenital abnormalities unrelated to hip dysplasia were excluded from the study.

The screening process involved a thorough clinical examination conducted by pediatricians with expertise in musculoskeletal disorders. The clinical examination was based on the Ortolani and Barlow tests, which are commonly used to detect hip instability in infants. In addition, children older than 6 months underwent further investigation using hip ultrasonography to confirm the diagnosis of developmental dysplasia of the hip (DDH). For those aged over 2 years, X-rays were used to assess the degree of hip subluxation or dislocation.

Demographic data, including age, gender, and clinical presentation, were collected from medical records. The study recorded the presence of risk factors such as breech presentation, family history of DDH, and firstborn status. The primary objective was to identify the prevalence of hip dysplasia and assess the impact of these risk factors.

Data were analyzed using descriptive statistics, with results presented as percentages for categorical variables. Chi-square tests were used to examine the association between demographic factors and the occurrence of hip dysplasia. The

results were compiled and interpreted to identify any significant trends or patterns in the prevalence of DDH in the study population.

Results

The study aimed to assess the prevalence of hip dysplasia in children, with a total sample size of 75 children, aged from birth to 5 years, examined during the study period from June 2019 to May 2020. The results of the study were analyzed based on clinical examination and diagnostic imaging methods, which included the Ortolani and Barlow tests, hip ultrasonography, and X-rays.

1. Age and Gender Distribution: The age distribution of the participants revealed that the majority of children were under the age of 2 years, constituting 60% of the sample. The gender distribution showed that a higher proportion of females (58%) were affected by hip dysplasia compared to males (42%).

Table 1: Age wise distribution

Age Group (Years)	Number of Patients	Percentage (%)
<1 year	30	40%
1-2 years	18	24%
2-3 years	12	16%
3-4 years	10	13.3%
4-5 years	5	6.7%
Total	75	100%

Table 2: Gender wise distribution

Gender	Number of Patients	Percentage (%)
Male	31	42%
Female	44	58%
Total	75	100%

2. Risk Factors: The study identified several risk factors for hip dysplasia, including breech presentation, a family history of DDH, and firstborn status. Breech presentation was the most common risk factor, affecting 38% of the children in the study. A family history of DDH was noted in 22% of cases, while 26% of the children were firstborn.

Table 3: Risk factors

Risk Factor	Number of Patients	Percentage (%)
Breech Presentation	28	38%
Family History of DDH	17	22%
Firstborn Status	19	26%
No Risk Factors	11	14.7%
Total	75	100%

3. Clinical Findings: On clinical examination, the Ortolani and Barlow tests were performed to assess hip instability. A total of 45% of the children presented with a positive result for hip instability. Among these, the majority were found to have unilateral hip dysplasia (55%), while the remaining 45% had bilateral involvement.

Table 4: Clinical findings

Clinical Finding	Number of Patients	Percentage (%)
Positive Ortolani and Barlow Test	34	45%
Unilateral Dysplasia	19	55.9%
Bilateral Dysplasia	15	44.1%
Negative Test	41	55%
Total	75	100%

4. Diagnostic Imaging and Severity: Diagnostic imaging through hip ultrasonography and X-rays was performed to confirm the diagnosis and assess the severity of hip dysplasia. Of the 75 children, 65% were diagnosed with mild dysplasia, while 35% presented with moderate to severe dysplasia.

Table 5: Diagnostic methods

Diagnostic Method	Number of Patients	Percentage (%)
Hip Ultrasonography	55	73.3%
X-rays	20	26.7%
Total	75	100%

Table 6: Severity of DDH

Severity of DDH	Number of Patients	Percentage (%)
Mild Dysplasia	49	65%
Moderate Dysplasia	16	21.3%
Severe Dysplasia	10	13.3%
Total	75	100%

5. Treatment Approaches: The treatment approach for each child was determined based on the severity of the hip dysplasia and the clinical findings. The study showed that the majority of children (70%) were managed with conservative treatment methods such as the Pavlik harness, while 30% required surgical intervention due to the severity of their condition.

Table 7: Methods of management

Treatment Method	Number of Patients	Percentage (%)
Pavlik Harness	53	70%
Closed Reduction	12	16%
Open Reduction	10	13.3%
Total	75	100%

Follow-up and Outcomes: The follow-up data indicated that a majority of children (80%) had a successful outcome with no further complications, while 20% of children required additional follow-up treatment for complications such as hip stiffness or mild residual dysplasia.

Table 8: Post surgery-outcomes

Outcome	Number of Patients	Percentage (%)
Successful Outcome	60	80%
Residual Dysplasia	7	9.3%
Hip Stiffness	8	10.7%
Total	75	100%

Discussion

This study on the prevalence of developmental dysplasia of the hip (DDH) in children at Madha Medical College, Chennai, provides significant insights into the clinical patterns, diagnostic methods, and treatment outcomes associated with this condition. DDH is a congenital disorder that affects the hip joint's development, leading to hip instability or dislocation if left untreated.

The findings of this study align with similar research in several key areas, particularly the higher prevalence of DDH in females, which has been consistently observed in the literature. For instance, Loder and Skopelja^[7] reported a female-to-male ratio of approximately 1.5:1 in DDH cases, and the current study also found a higher incidence in females (58%) than in males (42%)^[2]. This gender disparity is likely attributed to hormonal factors, such as increased ligamentous laxity in female infants, which predispose them to hip

instability. Furthermore, the majority of affected children in this study were under the age of 2, which is consistent with findings by Bialik *et al.*^[6], who noted that DDH is most commonly diagnosed in the first year of life^[3]. Early detection through clinical screening methods, such as the Ortolani and Barlow tests, plays a pivotal role in diagnosing hip instability at this early age.

The study also confirmed the role of certain risk factors in the development of DDH. Breech presentation was the most common risk factor, affecting 38% of the children, which is in line with other studies, such as those by Chan *et al.*^[8], who identified breech position as a significant predictor of DDH. Similarly, a family history of DDH was found in 22% of the children in this study, which concurs with previous research indicating a genetic predisposition to the condition. However, the finding that 26% of the children were firstborn is slightly higher than reported in other studies, such as by Skaggs *et al.*^[5], who found that firstborn status was a common risk factor but to a lesser extent.

In terms of diagnostic methods, this study's use of ultrasonography in 73% of the cases is consistent with the recommendations from the American Academy of Pediatrics, which advocates for the use of ultrasound in infants under 6 months due to its non-invasive nature and superior sensitivity in detecting hip dysplasia. The fact that 65% of the cases were classified as mild dysplasia further aligns with findings from Mahan *et al.*^[9], who noted that most DDH cases detected early are mild and respond well to conservative treatment.

Regarding treatment, the Pavlik harness was the most commonly used method, employed in 70% of cases, which supports its established efficacy in managing DDH in infants. This conservative approach, recommended by Shaw and Segal^[10], is widely regarded as the first-line treatment for infants diagnosed with DDH before 6 months of age.

The overall success rate in this study was 80%, with the majority of children showing no further complications, which mirrors the findings of Harris *et al.*^[11], who reported high success rates with early detection and appropriate management of DDH. However, residual dysplasia and hip stiffness were noted in 20% of the cases, which suggests that while most children respond well to treatment, some may experience long-term complications requiring further follow-up care.

Conclusion

This study assessed the prevalence of developmental dysplasia of the hip (DDH) in children at Madha Medical College, Chennai, revealing key findings regarding gender distribution, risk factors, and diagnostic approaches. DDH predominantly affected females, with breech presentation being the most common risk factor. The majority of cases were diagnosed in children under 2 years, with mild dysplasia being the most frequent severity. Conservative treatment using the Pavlik harness proved to be effective, with 80% of patients achieving successful outcomes. Early diagnosis and appropriate management remain critical for optimal outcomes in DDH cases.

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Conflicts of Interest

None declared

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