Incidence of Developmental Dysplasia of the Hip among Jordanian Population

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ABSTRACT

Introduction: Developmental Dysplasia of the Hip is a disorder with spectrum of abnormal development of the hip joints , normally the femur head fits firmly in the socket of the acetabulum, and in children with hip dysplasia the hip joint is not formed normally, and the femur head is loose in the acetabular socket that may dislocate easily[16] .
In children with hip dysplasia , many risk factors can increase its occurrence among pediatric age group. If not detected early, it might lead to a life-long disability and increase the burden on patients as well as healthcare systems.

Objective: to assess the incidence of developmental dysplasia of the hip among Jordanian population.

Methods: Prospective observational study conducted between 1st of January 2017 to 1st of January 2018 at King Hussein Medical city to assess the number of cases with positive diagnosis of Developmental dysplasia of the hip(DDH) based on pelvic x ray done at the end of three months age(4 months), in addition to assess associated risk factors that might increase its occurrence.

Results: A total number of 4369 live-born fulfilled the criteria, with male to female ratio almost 1:1, there analysis showed the incidence of Developmental Dysplasia of the Hip in Jordan is 17 per 1000 live-birth, with 2:1 female to male ratio. 73% of cases involved both hip joints, while 27% of cases involved the left hip joint only. Furthermore, a variation of occurrence was noticed between first and second born babies to be 30% and 38% respectively, most of them delivered through normal vaginal delivery (77%)
.
Conclusion: with an incidence of 17 per 1000 live birth among Jordanian population is considered high number that need more awareness programs and screening protocol and health care system regulation and resources to avoid late sequels and morbidity.

Keywords: hip dysplasia, incidence, screening, risk factor.

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Introduction

Developmental dysplasia of the hip (DDH) is a common as well as preventable cause of childhood disability. This disorder has a wide variability of clinical presentation ranging from dysplasia to frank hip dislocation.

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The etiology of DDH is multifactorial, influenced by genetics, hormones and certain physical factors (1). All of these confounding factors makes DDH an epidemiological conundrum (2).
The great variability in the pathological process entails a wide variation in clinical findings in these patients, ranging from a normal clinical exam to subtle, difficult-to-detect changes to obvious physical changes associated with the frankly dislocated hips.
A combination of a proper physical exam, good assessment of patient risk factors and proper use of radiographic tools leads to early diagnosis. Providing these patients with appropriate treatment early, which guarantees a good outcome and prevents future disability.
Knowing our national incidence and risk factors, which might differ from previously published studies from different countries, will help policy makers and the health care system to put plans and regulations for early diagnosis and prevention of DDH in action (3). In this study we aim to figure out the DDH incidence among Jordanian population reflected by data collected from a major referral Centre.
To the best of our knowledge, this is the first incidence study conducted among the Jordanian population.

Material and method

After being approved by the ethical committee at Royal Medical Service, we conducted this prospective observational study at King Hussein Medical Centre between 1st of January 2017 and 1st of January 2018. During this period, all healthy newborn who discharged from nursery room within 48 hours were included in this study with a total number of 4369 newborns and all details about mode of delivery, order in the family, history of musculoskeletal deformities as well parents living area and phone number for later contact were recorded.
On the other hand, all newborns with syndromic features as well as spinal dysraphism, cerebral palsy or other neurological disease, life threatening malformation that mandate prolonged hospital stay were excluded from the study.
The parents of newborns included in the study were educated about the developmental dysplasia of the hip and the value of having pelvic x ray at the beginning of 4 months for early initiation of treatment if needed.
At the beginning of 4 month months, parents were asked (via phone call) if their children had been evaluated for DDH, and for those with a positive response, second comprehensive evaluation that included proper clinical examination and re-reading of the pelvic x ray by the senior pediatric orthopedic at the pediatric clinic at Royal Rehabilitation Centre. Of these participants, patients with a confirmed diagnosis of DDH that required active treatment with orthosis were regarded as DDH cases.

Results

A total number of 4369 live-born neonates that fulfill the inclusion criteria were included in our study during the determined period. The female to male ratio was almost 1:1 with 2174 females and 2195 males.
All determined samples respond to our phone call questioning of having developmental dysplasia of the hip evaluation. A total number of 74 cases were diagnosed to have DDH; confirmation of the diagnosis was done through reevaluations by a senior pediatric orthopedic who confirmed the diagnosis, making the incidence 17 per 1000 live birth in Jordan.

Analysis of this DDH group showed that 46 females (62%) and 28 males (38%) cases, with about 2:1 female to male ratio **(figure 1)**. Of the DDH group, 54 cases had a bilateral hip involvement (73%), and 20 cases with had only the left side involved (27%) (**Table I**). Moreover, 22 cases were first-born babies and 28 cases were a second-born baby, accounting for 30% and 38% respectively. Most cases were delivered through normal vaginal delivery (57 cases, 77%), and only 14 cases were delivered through cesarean section (19%) (Table2 and **(figure2).**

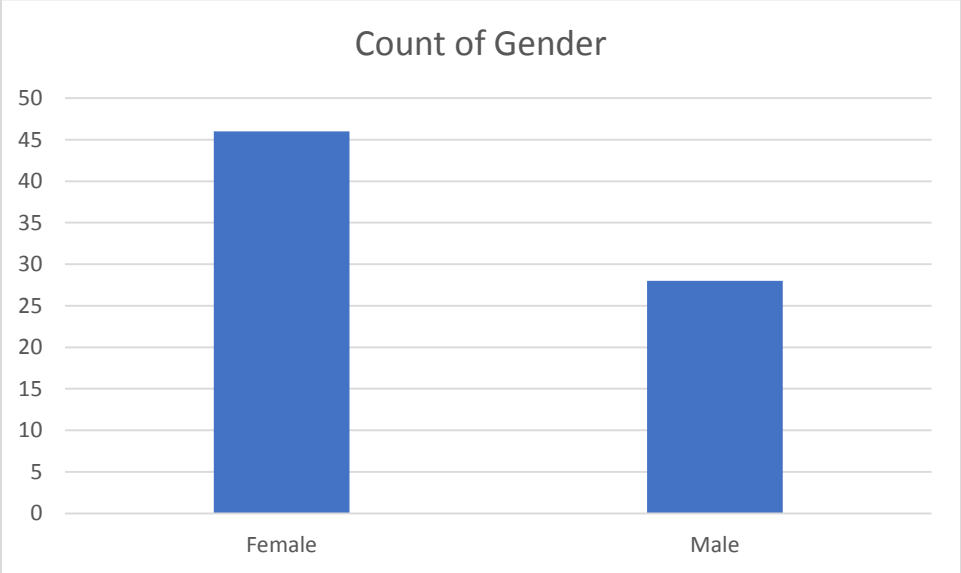

Figure 1

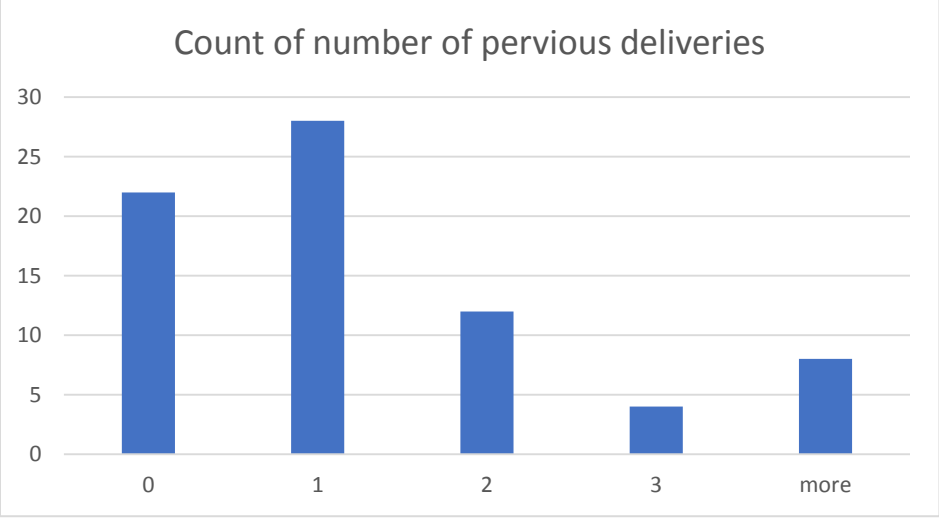

Figure 2

Table I

DDH side	Count of DDH side	%
Bilateral	54	72.97297297
Left	20	27.02702703
Total	74	100

Table II

Type of delivery	No of pt's delivered through this mode	%
C/S	14	18.9
I/D	3	4.1
V/D	57	77.0
Total	74	100

Discussion

Considerable variation exists in published studies regarding the incidence of DDH, being high among American Native Indians and low in the in African population. In addition to genetic factors as a cause of this variability, the age at which we do the clinical evaluation (new born, 1 month or 3 months) contributes to the calculated incidence, where many hips tend to stabilize with age as shown in Barlow's study (4). Other potential variables to be considered are the accuracy of the used modality for the diagnosis and competency of treating physicians to interpret these modalities (5) (1). Even different geographic locations within the same ethnic group may contribute to this variability (6,7). A more recent focus on the genetic role in hip dysplasia, and due to diseases complexity and wide spectrum of pathology, its agreed to have a polygenic background. (8)

Several factors are associated with increased risk of having DDH that is well described in many studies. Among these studies, there is a general agreement that breech presentation, being a female, first born and even second-born deliveries are associated with an increased risk of DDH (1). Regarding the mode of delivery, conflicting evidence is found in different studies. It is known that most breech presentation is delivered by cesarean section, which will be a confounding factor. In a large study of the South Australian population, delivering breech presenting cases through cesarean section decreased the risk of having DDH, which is in line with the logical thought that cesarean delivery is less traumatic to susceptible hips (9). Swaddling, which was a common traditional behavior of dealing with newborns, is regarded as one of the most important risk factors for developing DDH after delivery. Avoiding this or doing it in a safer way by not forcefully adducting the hips has been shown to decrease the risk of DDH by six times in many studies (10,11).

Analysis of our cohort of dysplastic hips patients showed some variability from previously published data. Among our patients group, most of the patients were female with a ratio of 2:1, which's slightly lower than published articles, this is might be due to sample size, despite the recent guidelines released from American Academy of Orthopedic surgeon didn't consider female as a risk factor for hip dysplasia. Bilateral hip dysplasia was the commonest among our group, 54 hip (73%) of the cases, at this regard, studies showed considerable variability, and despite the left side being the commonest side, still some studies that bilateral pattern is as common as 70% (12). In our group of patients, the second born delivery affected more frequently than the first baby, 28 and 22 cases respectively which's contrary to classically known about the first baby carries the highest risk, and this observation also noted among south Australian populations (13). these deviations in risk factors from previous studies worthy to be considered among Jordanian population in future studies.

Still many studies agreed that risk factors are not good predictor for having hip dysplasia. Only 1 out of 75 with a risk factors have dislocated hips and risk factors present in 10 to 25% of patients with hip dysplasia. On the other hand, 1 of 11 infants with clinical instability ended up with dislocation, emphasizing the importance of competent comprehensive clinical examination (14)

There is a lack of general agreement regarding the best screening programs (15). According to 2015 recommendation from American College of Orthopedic Surgeon (16), they recommend against universal use of hip sonography and support use of radiographic studies (sonography or radiography) before the age of six months in newborns with one of the following risk factors, breech presentation, family history and history of clinical instability. These recommendations based on the evidence that many neonatal hips get stabilized by the age of six months. Following such protocol raise the concern of facing more missed cases with late presentation of hip dysplasia. Other countries like Austria, adopt a universal screening program, such a program efficiently reduce the number of late presenting cases from 1 in 3000 at 1991 to 1 in 10000 at 2007. (14)

At the Jordanian Royal Medical service, we follow a universal program by doing pelvic x ray at the beginning of 4 month and initiation of treatment based on careful interpretation of x ray and to be correlated with clinical examination.

One of the limitations of the study was that the cases presented late were not included in the calculated incidence, which make the real number higher.

Furthermore, we might miss cases from our survey because we rely only on family response about the diagnosis, which raises concerns about false negative diagnoses.

Conclusion

DDH is a common pediatric problem that, if not provided appropriate treatment in a timely manner, will result in significant problems.

An incidence of 17 per 1000 live birth, based on data from a single major Jordanian institute, is regarded as a high percentage that needs great attention and more governmental regulations to increase awareness among the population and mandate a national screening program.

Unfortunately, we still encounter late or neglected cases which may increase the overall incidence in Jordan.

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