

# Investigating the Incidence and Risk Factors for Congenital Dislocation of the Hip Joint in Infants Born in Amirol-Momenin (PBUH) Hospital in the City of Zabol in 2016

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## Abstract

**Introduction:** Congenital dislocation of the hip joint is a defect in which the upper end of the thighbone (femur) is not properly located in the acetabulum socket. The present study aimed at determining the incidence and risk factors of congenital dislocation of the hip joint in the term infants born in Amirol-Momenin (PBUH) Hospital in the city of Zabol in the year 2016.

**Methods:** This is a descriptive-analytical study of a cross-sectional type conducted on all the infants born in Amirol-Momenin (PBUH) Hospital in the city of Zabol in 2016 as the investigated statistical population. The gathered data were described in SPSS 18 using frequency, percentage, mean, and standard deviation indices analyzed using Chi-square test.  $p < 0.05$  was considered to be significant.

**Results:** In this study, 1400 infants born in the department of obstetrics and gynecology of Amirol-Momenin (PBUH) Hospital in 2016 were investigated, of whom 32 infants were diagnosed with developmental dysplasia of the hip using Ortolani and Barlow tests, hence an incidence rate of 2.3% or 23 cases in every 1000 live births.

**Conclusion:** The results of the present study showed that the incidence of DDH in this region is higher than its general incidence rate, which could be due to a specific ethnicity, the high rate of birth-giving in families, and the special lifestyle of the region. On the other hand, given that instability has a higher incidence than complete dislocation or dislocatability, the infants with DDH in the present study may be diagnosed with joint instability after radiologic examination.

**Keywords:** Congenital Dislocation, Hip Joint, Risk Factors

## INTRODUCTION:

Congenital dislocation of the hip joint is a defect in which the upper end of the thighbone (femur) is not properly located in the acetabulum socket. In most of the infants, the acetabulum socket is not formed properly during the fetal development, and it does not have adequate shape and depth for holding the upper end of the thighbone. The physiological causes of the condition include positive family history of the condition (20%), general looseness of the ligaments, mother estrogen, other relaxin hormones that cause the looseness of the pelvic ligaments, and the feminine sex which has an incidence of 9 times of the masculine sex. Other factors include first pregnancy, Breech presentation, inadequacy of the amniotic fluid, and the physical conditions of the infant's body after birth. If the condition is diagnosed early, and the end of the thighbone is repositioned in the acetabulum socket, the bones at both sides regain their normal formation pattern and, in many cases, compensate their lag. Otherwise, the lag in the development of the joint and its deformation will be intensified as the infant gets older. This shows that the diagnosis and the treatment of the condition should be done as soon as possible. The Ortolani test is the best method to diagnose the instability of the hip for all newborn infants. Early treatment of the unstable hip with Pavlik harness is highly effective and reliable and is strongly recommended. The congenital dislocation of the hip has an incidence rate of 1%. Not detecting the condition causes obvious long-

term disabilities. Therefore, all infants should be screened through careful precise physical examination. However, ultrasound screening is only recommended for infants having the risk factors. Since the incidence of congenital dislocation of the hip is likely, the routine examinations should be administered for all infants during the first year of life. Generally, it is possible to diagnose and treat infants with congenital diseases during the first and a half year of their life, a period of time during which the highest level of recovery occurs after treatment. Early treatment of the congenital dislocation of the hip reduces the risk of avascular necrosis of the femur. It also causes normal development of the acetabulum.

Generally, the treatment of these infants aims to:

1. Lower the upper end of the thighbone through bone stretching or skin stretching
2. Repositioning of the femur in the acetabulum through a closed technique or through surgery

The present study aimed at determining the incidence and risk factors of congenital dislocation of the hip joint in the term infants born in Amirol-Momenin (PBUH) Hospital in the city of Zabol in the year 2016.

## METHODS:

This is a descriptive-analytical study of a cross-sectional type conducted on all the infants born in Amirol-Momenin (PBUH) Hospital in the city of Zabol in 2016 as the

investigated statistical population. Given an incidence rate of 2.8% for the congenital dislocation of the hip joint in Orak et al.'s study, the required sample size for estimating the incidence of the condition with a confidence of 90% and a maximum error of 7% was estimated to be under 1400 people using the following statistical formula. (Ratio

$$\text{estimation) } n = \frac{Z^2 \cdot \frac{a}{1-a} p(1-p)}{d^2}$$

The data-gathering instrument was a checklist containing the investigated variables, which included: the sex of the infant, the number of previous children, delivery type (vaginal delivery or cesarean delivery), presentation of the infant (cephalic or breech), and positive or negative ortolani and Barlow maneuvers, whose information were obtained the infants' records and clinical examinations. The time of entering the study was the birth time, when the information about the infant, the factors making the infant prone, and positive ortolani and Barlow maneuvers are recorded in the checklist. The criterion for diagnosing DDH is the positivity of one or both of the ortolani and Barlow maneuvers. This way, the incidence and the contributing factors in the congenital dislocation of the hip joint is obtained. The gathered data were described in SPSS 18 using frequency, percentage, mean, and standard deviation indices analyzed using Chi-square test.  $p < 0.05$  was considered to be significant.

**RESULTS:**

In this study, 1400 infants born in the department of obstetrics and gynecology of Amirol-Momenin (PBUH) Hospital in 2016 were investigated, of whom 32 infants were diagnosed with developmental dysplasia of the hip using ortolani and Barlow tests, hence an incidence rate of 2.3% or 23 cases in every 1000 live births. Table 1 presents the obtained demographic information and their relationship with DDH.

According to Table 1, of all the infants with DDH, 31.2% were masculine and 68.8% were feminine. The results of the Chi-square test did not show a significant relationship between sex and having the dysplasia of the hip joint. Also, the total number of infants with DDH was 78.1% for term pregnancy, and 21.9% for pre-term pregnancy. Fisher's exact test showed a significant relationship between age of pregnancy and DDH ( $p < 0.05$ ). Of all the infants with DDH, 96.9% were born through a vaginal delivery and 3.1% through a cesarean delivery. The Chi-square showed a significant relationship between DDH and delivery type ( $p = 0.002 < 0.05$ ). According to Table 1, there was not a significant relationship between the presentation of the infant and having DDH, based on Fisher's test ( $p = 1.00 > 0.05$ ). Also, based on the results of a Chi-square test, there was a significant relationship between DDH with the infant's rank and positive ortolani light percentage ( $p = 70.000 < 0.05$ ).

**Table 1:** Determining the relationship between sex, age of pregnancy, delivery type, birth presentation, the infant's birth rank, ortolani and Barlow maneuvers, and family history of congenital dislocation of the hip with the incidence of congenital dislocation of the hip joint in newborn infants

Variable		Yes		No		P value
		Frequency	Percentage	Frequency	Percentage	
Sex	Female	22	68/8	797	85/3	0/234
	Male	10	31/2	571	41/7	
Pregnancy age	Term	25	78/1	1324	96/8	0/001
	Pre-term	7	21/9	44	3/2	
Delivery type	Vaginal	31	69/9	991	72/4	0/002
	Cesarean	1	3/1	377	27/6	
Presentation	Breech	0	0	22	1/6	0/001
	Cephalic	32	100	1346	98/4	
Infant's birth rank	First	14	43/8	323	23/6	0/003
	Second	10	31/2	311	22/7	
	Third	8	25	423	30/9	
	More	--	----	311	22/7	
Ortolani maneuver	Positive	28	87/5	-----	-----	0/001
	Negative	4	12/5	1368	100	
Barlow	Positive	24	75	-----	---	0/001
	Negative	8	25	1368	100	
Family history	Positive	2	6/3	7	0/5	0/016
	Negative	30	93/8	1361	99/5	

### DISCUSSION AND CONCLUSION:

In the present study, the incidence of developmental dysplasia of the hip joint was estimated to be 2.3% or 23 cases in every 1000 live births, a finding similar to the studies by Czeizel et al. with 27.5%, Venkalkana et al. with 25.9%, DiBella et al. with 25.5%, Mellbin et al. with 24.6%, Rabin et al. with 47.2% incidence, but different from Sabin et al. with 1.7%, Dogruel et al. with 47.2%, Moosd et al. with 3.17, and Mirdael et al. with 1.5% of incidence. The difference could be due to a specific ethnicity, high birth-giving rates in families, and the special lifestyle of the region. These differences are probably due to environmental factor such as parenting patterns rather than background genetic factors. In this study, no significant relationship was found between the infants' sex and having dysplasia of the hip joint, a result different the results obtained by Vio, Khajeh, Falinaz-treiber, Malek-Mohammadi, and Plate. In the study by Vio, the feminine sex was considered to be a risk factor for having DDH. Also, in the study by Khajeh, the feminine sex was one of the risk factors for developmental dysplasia of the thigh joint. In a ten-year-long study by Tribo which was conducted in Slovenia, it was shown that the pathological cases were more common in girls than boys, and also more common in the leg pelvic joint than the right one. In the study by Malek-Mohammadi et al., the incidence of DDH among feminine infants was reported to be higher than the masculine infants. These differences in results could be due to the small sample size and the limited time period in the present study. On the other hand, the role played by ethnic characteristics of the investigated population cannot be ignored. Based on Fisher's exact test, there was a significant relationship between age of pregnancy and having DDH. This result is similar to the study by Malek-Mohammadi, in which it was shown that there is a significant relationship between post-term pregnancy and having DDH, and that most infants with DDH are born with a pregnancy age of more than 38 weeks. Therefore, with an odds ratio of 1/7, Pregnancy age was considered to be a risk factor for having DDH. Based on the results of the Chi-square test, no significant relationship was found between delivery type and having developmental dysplasia of the hip joint ( $p < 0.05$ ). This finding is similar to the results reported by Woodcare et al. who showed that there is significant relationship between having DDH and vaginal delivery, and that vaginal delivery with an odds ratio of 2/7 is considered a risk factor, and cesarean delivery was considered to be a protecting factor for having DDH. Based on the results of Fisher's exact test, no significant relationship was found between presentation type and having DDH. This finding is contrary to the results obtained by Khajeh who showed that breech infant presentation increases the likelihood of hip joint instability. Breech presentation status was reported as a risk factor in the studies by Vio et al. in southern Australia, Pollet et al., and Orak et al. this difference could be due to the small sample size in the present study compared to other studies. On the other hand, given that vaginal delivery and breech presentation are considered to be two risk factors for DDH, it should be noted that all single-infant with breech

presentation are born through cesarean and, as a result, this could one of the reasons for the differences found in the present study in comparison with other studies. Based on the results of the Chi-square test, there was a significant relationship between the infant's birth rank and having DDH. This finding is in line with the results reported by Malek-Mohammadi et al. who showed that most infants with DDH are the mother's first child. Also, the study by Behrman reported that 60% of infants with DDH are the first child in their families. In the study by Woodcare et al., it was shown that there is a significant relationship between having DDH and being the first child in the family, and that the likelihood of having an infant with DDH in the next deliveries in decreased as the number of previous deliveries increases, and that being the first rank is a risk factor with an odds ratio of 1/8. In the present study, 75% of the infants had positive ortolani maneuver and also 87.5% had a positive Barlow test. Based on the results of Fisher's exact test, there was a significant relationship between positive Barlow and ortolani maneuvers with developmental dysplasia of the hip joint ( $p < 0.05$ ). In the study by Show et al., this test was reported to be one of the important clinical factors in having DDH. The results of our study showed that a positive ortolani test is associated with more ultrasound pathobiology changes than a negative ortolani test, and that hip clicks and Barlow maneuvers are of lesser importance in the clinical diagnosis of DDH. Tehnader states that the examiner's experience has an important role in diagnosing DDH. Having done higher numbers of examinations increases the accuracy of the examination, and doing the examination slowly increases the status of clinical examinations. The results of Fisher's exact test showed that there is a significant relationship between family history and having DDH ( $p < 0.05$ ). This finding is in line with the results reported by the two studies one by Orak and the other by Woodcare who showed that, with an odds ratio of 15/9, family history is considered a risk factor. The results of the studies by Koparal and Omeogln indicate that the incidence of DDH in infants with at least one clinical symptom in favor of DDH increases the incidence rate by 16 times in comparison with infants without any clinical symptoms, and the existence of one risk factor increases the incidence of DDH by three time in comparison with cases without any risk factors. In the study by Pollet et al., it was shown that the incidence of DDH among infants with clubfoot is higher than other infants. Also, in the study by Malek-Mohammad et al., it was shown that 17.7% of children with DDH have other nervous and upper extremity anomalies, and it was suggested that the fetus be inspected for DDH in case of witnessing such anomalies.

### CONCLUSION:

The results of the present study showed that the incidence of DDH in this region is higher than its general incidence rate, which could be due to a specific ethnicity, the high rate of birth-giving in families, and the special lifestyle of the region. On the other hand, given that instability has a higher incidence than complete dislocation or dislocatability, the infants with DDH in the present study

may be diagnosed with joint instability after radiologic examination. Furthermore, if risk factors are accompanied by clinical symptoms, the incidence of DDH will be by far higher. Therefore, doing meticulous examinations and paying attention to risk factors on the part of delivery personnel and child healthcare staff are of great importance. Also, early diagnosis and treatment of DDH and continual follow-up of the infants under treatment is highly important, since delayed treatment or lack of careful follow-up measures of the infants under treatment increases the complications of the treatment.

**REFERENCES:**

1. Gulati V , Eseonu K , sayani J , Ismail N , Uzoigwe C , Choudhury MZ , et al. Developmental dysplasia of the hip in the newborn: A systematic review. *World journal of orthopedics*. 2013 ; 4(2) : 32-41.
2. Phelan N ,Thoren J, Fox C, O Daly B, o Beirne J . Developmental dysplasia of the hip: incidence and treatment outcomes in the Southeast of Ireland. *Irish Journal of Medical Science (1971 – 2015)* .184(2) : 5-411.
3. Richard M , Schoenevker P , Richards B, Flynn J, Vitale M. Screening the newborn for Developmental dysplasia of the hip: now what do we do? *journal of Pediatric orthopedics*. 2007; 27(6): 10-607.
4. Moraleda L, Albinana J , Salcedo M , Gonzalez-Moran G. Dysplasia in the development of the hip. *Rev Esp Cir Ortop Traumatol* .2013; 57(1) :67-77.
5. Rhodes A, Clarke N. A review of environmental factors implicated in human developmental dysplasia of the hip. *Journal child Orthop*. 2014; 8(5) : 9-375.
6. Roof AC, Jinguji TM, White KK. Musculoskeletal screening: Developmental dysplasia of the hip. *Pediatric annals*.2013; 42(11) : 35-229.
7. Mahmoodi Z, rezaie Keikhaie K, Salarzaei M. The relationship between main cardiac risk factors and acute myocardial infraction in the patients referring to Zabol Amir Al-Momenin Hospital in 2016. *Int. J. Adv. Res. Biol. Sci*. 2017;4(8):36-9.
8. Sharpe P, Mulpuri K Chan A, Cundy P, Differences in risk factors between early and late diagnosed developmental dysplasia of the hip. *Arch Dis Child Fetal Neonatal* . 2006; 91(3) : 62-158.
9. Ponseti I. Growth and Development of the acetabulum in the normal child. Anatomical, histological, and roentgenographic studies. *J Bone Joint Surg Am* . 1978; 60(5): 85-575.
10. Czeizel A, Vizkelety T, Szentpeteri J. Congenital dislocation of the hip in Budapest, Hungary. *British journal of preventive & social medicine*. 1972; 26(1) : 15-22.
11. Vencalkova S, Janata J. Evaluation of screening for developmental dysplasia of the hip in the Liberec region in 1984-2005. *Acta chirurgiae orthopaedicae et traumatologiae Cechoslovaca*. 2009; 76(3) : 24-218.
12. Di Bella D, Di Fede G, Valastro M, Rampulla V. Congenital hip dysplasia in Sicily. *La Pediatria medica e chirurgica : Medical and surgical pediatrics*. 1996; 19(4) : 4-291.
13. Mellbin T. The children of Swedish nomad Lapps. VII. Congenital malformations. *Acta Orthop Scand*. 1962; 131 (Suppl): 6-62.
14. Rabin DL, Barnett CR, Arnold WD, Freiburger RH, Brooks G. Untreated congenital hip disease: a study of the epidemiology, natural history, and social aspects of the disease in a Navajo population. *American Journal of Public Health and the Nations Health*. 1965; (Suppl-2) :i. 44-355.
15. Sahin F , Akturk A, Beyazova U , CakIr B, BoyunaGa O, Tezcan S, et al. screening for developmental dysplasia of the hip: results of a 7-year follow-up study. *Pediatrics international*. 2004; 46(2) :6-162.
16. Dogruel H, Atalar H, Yavuz O, Sayli U. Clinical examination versus ultrasonography in detecting developmental dysplasia of the hip. *International orthopedics*. 2008; 32(3): 9-414.
17. Moosa NK, Kumar PT, Mahmoodi SM. Incidence of developmental dysplasia of the hip in Dubai. *Saudi medical journal*.2009; 30(7): 5-952.
18. Mirdad T. Incidence and pattern of congenital dislocation of the hip in Aseer region of Saudi Arabia. *West African journal of medicine*. 2002; 21(3). 22-218.
19. Khajeh B, Khajeh A. Improvement rate of sonographic signs of untreated unstable hip of neonates born at Qazvin Kosar Hospital (2008-2009).2010.
20. Falliner A, Hahne HJ, Hassenpflug J. Sonographic hip screening and early management of developmental dysplasia of the hip. *Journal of Pediatric Orthopaedics B*. 1999; 8(2) : 7-112.
21. Treiber M, Tomazic T, Tekauc-Golob A, Zolger J, Korpar B, Burja S, et al. Ultrasound screening for developmental dysplasia of the hip in the newborn: a population-based study in the Maribor region, 1997-2005. *Wiener klinische Wochenschrift*. 2008; 120(1-2): 6-31.
- 22 .Mahmoodi Z, Keikhaie KR, Salarzaei M, Havasian MR. The Incidence of Different Kinds of Cardiac Arrhythmia after Myocardial Infarction in Smokers and Opium Abusers Hospitalized in Imam Ali Hospital, Zahedan, 2016.
23. Pollet V, Percy V, Prior HJ. Relative Risk and Incidence for developmental dysplasia of the hip. *The Journal of Pediatrics* 2016.
24. Woodacre T, Ball T, Cox P. Epidemiology of developmental dysplasia of the hip within the UK: refining the risk factors. *Journal of Childrens Orthopaedics*. 2016; 10(6): 42-633.
25. Yiv B, saidin R , Cundy P, Tgetgel J, Aguilar j, McCaul K, et al. developmental dysplasia of the hip in South Australia in 1991: prevalence and risk factors. *Journal of paediatrics and child health*.1997; 33(2): 6-151.
26. Orak M, Onay T, gumustas S, Gursoy T, Muratli H. Is prematurity a risk factor for developmental dysplasia of the hip? *Bone Joint J*. 2015; 97(5): 20-716.
27. Kliegman RM, Behrman RE, Jenson HB, Stanton BM. *Nelson Textbook of pediatrics: Elsevier Health Sciences*; 2016.
28. Shaw BA , Segal LS. Evaluation and referral for Developmental Dysplasia of the Hip in infants. *Pediatrics*. 2016; 138(6) : e.7-31.
29. Bialik V, Bialik GM, Blazer S, Sugov P, Wiener F, Berant M. Developmental dysplasia of the hip: a new approach to incidence *Pediatrics*. 1999; 103(1); 9-93.
30. Lotio FM , RAbbaglietti G, Notarantonio M. The ultrasonographic image of the infant hip affected by developmental dysplasia with a positive Ortolanis sign. *Pediatric radiology*.2002; 32(6): 22-418.
31. egnander A, Terjesen T, Bredland T, Holen KJ. Incidence of Late diagnosed Hip Dysplasia After Different Screening Methods in Newborns. *Journal of Pediatric Orthopaedics B*. 1994; 3(1): 8-86.
32. Omerog H, Koparal S. The role of clinical examination and risk factors in the diagnosis of developmental dysplasia of the hip: a prospective study in 188 referred young infants. *Archives of orthopaedic and trauma surgery*. 2001; 121( 1-2): 7-11.