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Evaluating experiences and knowledge of developmental dysplasia of the hip management among healthcare professionals in Medina, Saudi Arabia

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ABSTRACT

Background: Developmental dysplasia of the hip (DDH) is a leading pediatric orthopedic condition with serious long-term consequences if not identified and treated early; despite the preventability of its complications, delayed diagnoses remain common in Saudi Arabia, highlighting the need to assess healthcare providers' knowledge and practices. This study aimed to evaluate the knowledge, experiences, and clinical practices related to DDH management among healthcare professionals in Medina, Saudi Arabia.
Methods: A cross-sectional design was used, involving 123 healthcare professionals who completed a validated self-administered questionnaire assessing knowledge of DDH risk factors, diagnosis, management, and screening practices, and the data were analyzed using descriptive statistics and chi-square tests to examine associations between demographic variables and knowledge levels.
Results: The results showed a mean knowledge score of 54.62% (±20.28%), with 44.7% of participants classified as having poor knowledge, 36.6% moderate knowledge, and only 18.7% demonstrating good knowledge, while no statistically significant associations were found between knowledge level and occupation, years of experience, workplace setting, or number of DDH cases encountered. Screening practices were inconsistent, as only 30.1% always examined infant hips and 46.3% did not perform assessments at every well-baby visit; although 60.2% relied on clinical examination for diagnosis, 42.3% reported a lack of access to ultrasonography, and 52% had not received formal training in DDH screening.
Conclusions: Despite these gaps, 86.2% of participants agreed that implementing standardized protocols would be beneficial, and overall, the findings indicate a clear deficiency in knowledge and inconsistency in screening and management practices, emphasizing the need for targeted training programs and standardized guidelines to enhance early detection and improve patient outcomes.

Keywords: Developmental dysplasia of the hip, Early detection, Healthcare professionals, Awareness, Saudi Arabia, Bracing, Ultrasonography

INTRODUCTION

Developmental dysplasia of the hip (DDH) encompasses a spectrum of hip joint abnormalities ranging from acetabular dysplasia and subluxation to complete dislocation, representing the most prevalent orthopedic condition in infants and a leading cause of early-onset hip osteoarthritis and total hip replacement in young adults.[1,2] The condition arises from an abnormal relationship between the femoral head and the acetabulum, with its etiology attributed to a combination of genetic, mechanical, and environmental factors.[3] When identified and managed early, DDH can be treated successfully using conservative non-surgical methods, with success rates exceeding 80%; however, delayed diagnosis substantially increases the likelihood of surgical intervention and long-term disability.[2,4] The global incidence of DDH varies considerably by race, ethnicity, and geographic region. In the United Kingdom, irreducible hip dislocation occurs in 0.5 to 0.8 per 1,000 live births, while the American Academy of Pediatrics estimates an incidence of 11.5 per 1,000 live births, with a markedly higher rate among females (19 per 1,000) compared to males (4.1 per 1,000).[6,7] In Saudi Arabia, the reported incidence is 10.46 per 1,000 live births; however, more than 30% of cases present late, a figure attributed predominantly to insufficient awareness among both the general population and healthcare providers.[7,8]

Several risk factors have been consistently associated with DDH, including female sex, breech presentation in the third trimester, positive family history, swaddling in the adducted and extended position, oligohydramnios, multiple gestations, and post-term gestation.[9-11] Among these, breech presentation carries the highest risk, with an odds ratio of 5.47, while female sex confers a fourfold increased incidence, likely mediated by maternal hormone-induced ligamentous laxity.[11] Diagnosis relies on a combination of clinical examination and imaging; the Ortolani and Barlow maneuvers are standard assessments in neonates and infants up to five months, while ultrasonography is the gold standard for infants under four months of age owing to the predominantly cartilaginous composition of the femoral head at this stage.[13,14,16] Radiographic evaluation becomes more informative beyond four months, and MRI may be employed in selected cases.[14,15] Treatment is guided by the patient's age; the Pavlik harness is the first-line conservative intervention for infants under six months with reducible hips, while open reduction via medial or anterior approaches is reserved for cases failing conservative management or presenting late.[18-20] If left untreated, DDH may progress to irreversible osteoarthritis, chronic pain, and the eventual need for total hip replacement.[22]

Despite the well-established clinical framework for DDH screening and management, evidence from the Saudi Arabian context suggests a persistent gap between recommended practice and actual clinical behavior. Over 30% of DDH cases in the Kingdom are diagnosed late, a pattern likely compounded by inadequate formal training, limited access to ultrasonography, and the absence of standardized national screening protocols.[7,8] While prior studies have examined DDH awareness among parents, data on the knowledge and practices of healthcare professionals — particularly those working in primary care settings — remain limited in the Medina region.[5]

This study therefore aimed to evaluate the knowledge, experiences, and clinical practices related to DDH management among healthcare professionals at Primary Health Care centers in Medina, Saudi Arabia, with the goal of identifying specific educational and infrastructural gaps to inform the development of targeted training programs and standardized screening guidelines.

Literature review

A disorder known as DDH occurs when the acetabulum and femur head have an irregular connection. As far as morphological, clinical, and radiological studies are concerned, there isn't a singular definition of the condition currently. Infants born with hip dislocation or instability are referred to as having dysplasia; in its residual form, this condition is known as hip dysplasia. Given that it affects infants and young children, parents are crucial in identifying their child's illness so that it can be treated early and any complications can be avoided.[5]

Incidence

The disease is more prevalent on the left side and in females. Between 0.5 and 0.8 cases of irreducible hip dislocation occur for per 1000 live births in the UK's screening population.[6]

Race, ethnicity and nation all have a substantial impact on the global incidence rate of DDH. In particular, prior research has revealed lower rates among Black communities and greater rates among Hispanic individuals. Zimbabwe has the lowest recorded incidence rates of DDH cases (0.06 per 1000 babies), according to the distribution of DDH cases across different nations. According to the American Academy of Pediatrics, there were 11.5 cases of DDH for every 1000 live births, with 4.1 cases for boys and 19 cases for girls. According to estimates, the yearly prevalence of DDH in the US is 1.7 per 1000 babies.[7] In Saudi Arabia, 10.46 cases of DDH are reported for every 1000 live births. However, over 30% of DDH cases in Saudi Arabia present late, and this is thought to be mostly because of a lack of awareness.[8]

Risk factor

There are several possible causes of DDH that have been identified. DDH has been linked to a number of factors, including a positive family history, joint laxity, breech presentation, oligohydramnios, swaddling of the newborn, female gender, multiple pregnancies, ethnicity and the coexistence of multiple orthopedic conditions in infants,

including torticollis and foot deformities.[9] The genetic component of DDH is substantial and consists not only of many associated genes but also presents a significant challenge in the case of systemic genetic aberrations affecting the skeleton mostly the extremities. Variable phenotypes and heterogeneous genetic backgrounds characterize systemic deformities. Family studies show that inheritance in patients suffering from DDH has often been consistent with the autosomal dominant pattern.[10]

Clinicians should do clinical screening because the following risk factors for hip developmental dysplasia have shown an increased prevalence of hip abnormalities.

Female sex

The incidence is four times higher in females than males. Maternal hormone-induced ligamentous laxity is probably the cause of the elevated occurrence. For girls the odds ratio is 4.14 (3 to 5.7).

Breech position

With an odds ratio of 5.47 (2.58 to 11.6), breech position is the most important risk factor for hip developmental abnormalities in the last trimester. The risk of hip developmental dysplasia is decreased by procedures that shorten the time spent in the breech position, such as external cephalic version and pre-labor cesarean surgery.

Family history

Numerous genes, including COL2A1, DKK1, HOXB9, HOXD9, and WISP3, have been linked to hip developmental dysplasia in Asians. 1.72 is the relative risk (0.05 to 55.00). With an estimated 6% chance of recurrence the risk is significant. Additionally, Robert et al proposed that the proinflammatory cytokines transforming growth factor-beta 1 (TGF-β1) and IL-6 are implicated in the pathophysiology of osteoarthritis, which may be linked to hip developmental dysplasia in the Caucasian population.

Swaddling

In certain populations such as Native American, Japanese and Turkish infants, swaddling babies in the adducted and extended position may raise the risk of hip developmental dysplasia. The American Academy of Pediatrics (AAP) and the Pediatric Orthopedic Society of North America (POSNA) are two international organizations that advocate hip-healthy swaddling.

In utero restriction

Hip developmental dysplasia can result from any physical restriction in the uterus, such as large for gestational age newborns, oligohydramnios or multiple gestations. Limitations in space can also raise the chance of anomalies including congenital knee dislocation, congenital muscle torticollis, and metatarsus adducts.

Post-term gestation

One risk factor for hip developmental dysplasia is post-maturity. However, there is no correlation between prematurity and an elevated risk.[11]

Diagnosis

Importance of early diagnosis of DDH, an early diagnosis, which is essential for an early treatment, is the fundamental prerequisite to achieve the best treatment results and to reduce the possibility of hip osteoarthritis in young adults.[12] A physical examination is performed on every infant. Since negative results cannot rule out DDH, they should be reexamined during well-baby clinic visits until the child is a year old. While the limited abduction sign is more typical in older children, the Ortolani and Barlow procedures are part of the assessment for neonates and infants up to five months.[13] Children's hip structure and development can be immediately reflected in imaging examinations, which are a crucial foundation for early diagnosis, therapy and follow-up following DDH management. Imaging data from MRI, X-ray, and high-frequency ultrasound are essential for the clinical diagnosis of DDH. No comprehensive and successful application plan has been developed, despite the fact that all three approaches are very adaptable when used to diagnose infants and young children with DDH.[14] A more practical way to assess hip growth is by radiographic examination. The technique of evaluating DDH is guided by a few typical lines on the X-ray of the juvenile pelvis because normal radiographs have poor diagnostic value in newborns because the femur and acetabulum's heads are primarily made of cartilage.[15]

For infants under 4 months old whose hip is cartilaginous and interferes with radiologic imaging of the femoral head, ultrasound is the gold standard because of its great sensitivity and specificity. However, as early as the first four weeks after birth, ultrasonography frequently reveals the existence of mild hip instability or immaturity, which goes away on its own in a few weeks. There is ongoing debate on the best time to check for DDH. Instead of the first two weeks following birth, Kolb et al advice waiting until 6–8 weeks.[16]

Management

For the quality of life of children to improve, early detection and treatment are essential. Nonsurgical techniques can be used to treat it completely.[17] The patient's age typically serves as a guidance for DDH treatment. Braces, such as the Pavlik harness, are typically used as a conservative treatment for newborns less than six months.[18] Arnold Pavlik, who referred to this as a "passive-mechanical" approach to treatment, ascribed this to the force of hip reduction and maintenance in a stiff

splint.[19] The medial and anterior approaches to the hip are the two most often employed techniques during OR for patients who do not respond to brace treatment or who arrive late. The iliopsoas, transverse acetabular ligament (TAL), ligamentum teres, neo-limbus, and pulvinar are among the tissues that are addressed in both methods as they impede concentric reduction. If necessary, the anterior technique also provides access for pelvic osteotomy and capsular plication. The medial technique reduces blood loss and offers improved access to the adductor musculature.[20]

Complications

DDH can result in compromised hip function and early-onset degenerative joint disease, especially if treatment is postponed. Hip instability, when identified during the neonatal period can often be effectively managed through non-surgical methods in most cases. However, delay in diagnosis raises the risk of needing surgical intervention.[21] Secondary changes occur in the soft tissues around the joint and then in the proximal femur and acetabulum if the hip dislocation is not identified in time. Treatment delays result in more challenges and a worse functional outcome. If left untreated, dysplasia can result in osteoarthritis, excruciating pain, and necessitate a total hip replacement.[22]

METHODS

Study design

This study employed a cross-sectional design using an online, structured questionnaire to assess the level of knowledge of DDH among healthcare providers in the Medina region, Saudi Arabia.

Study setting and population

The study was conducted at Primary Health Care centers in Medina, western region of Saudi Arabia. The population included two key groups of healthcare providers involved in pediatric care or orthopedics.

Inclusion and exclusion criteria

Participants were eligible for inclusion if they were licensed healthcare professionals actively practicing at Primary Health Care centers in Medina, Saudi Arabia, and were directly or indirectly involved in pediatric care or orthopedic management. Both physicians and allied health professionals were included regardless of their years of experience or subspecialty.

Participants were excluded if they were healthcare professionals not based in Medina, students or trainees not yet holding a professional license, individuals who did not consent to participate, or those who returned incomplete questionnaires.

Sampling technique and sample size

The sample size was calculated using OpenEpi version 3.01, based on a 50% expected prevalence, a 95% confidence level, and a 5% margin of error, yielding a minimum required sample size of 124 participants. A total of 123 participants completed the questionnaire, representing 99.2% of the calculated sample requirement. This marginal difference of one participant from the minimum threshold was considered statistically inconsequential and unlikely to affect the validity or generalizability of the findings.

Data collection instrument

The data collection tool was a self-administered questionnaire adapted from previously published research on DDH awareness and screening practices. The questionnaire consisted of four sections: demographic information, knowledge of DDH risk factors and diagnosis, experience with DDH management, and perceptions of screening practices.

Validation and reliability

The questionnaire underwent content validation by a panel of three experts in pediatric orthopedics and epidemiology. A pilot study was conducted with 50 participants (not included in the final analysis) to assess clarity, reliability, and internal consistency. The instrument demonstrated acceptable internal consistency with a Cronbach's alpha of 0.81.

Data collection procedure

The questionnaire was distributed electronically via WhatsApp and professional platforms to healthcare providers at the study sites. Participants were informed of the study objectives and provided informed consent before taking part in the survey.

Data analysis

Data were analyzed using IBM statistical package for the social sciences (SPSS) statistics version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize categorical variables as frequencies and percentages, and continuous variables as means and standard deviations (SD). Chi-square tests were applied to assess associations between participant characteristics and DDH knowledge level. A two-sided p value of ≤0.05 was considered statistically significant.

RESULTS

Table 1 presents the demographic and professional characteristics of the 123 participating healthcare professionals. The majority were family practitioners or general physicians (59.3%), followed by nurse practitioners and physician assistants (13.8%),

pediatricians (10.6%), and other specialties (16.3%). With respect to clinical experience, 62.6% had ten years or fewer in practice, 28.5% had 11–20 years, and 8.9% had 21 or more years of experience. Community hospitals represented the predominant practice setting (66.7%), followed by academic hospitals (26.0%) and private clinics (7.3%). Regarding prior exposure to DDH cases, 43.1% had never examined a suspected DDH patient, 35.8% had examined 1–3 cases, 15.4% had examined 3–10 cases, and only 5.7% had examined more than ten cases.

Table 1: Demographic and professional characteristics of study participants (n=123).

Characteristics	N	%
Clinical occupation		
Family practice/general practitioner	73	59.3
Nurse practitioner/physician assistant	17	13.8
Pediatrician	13	10.6
Other specialties*	20	16.3
Years of clinical experience		
≤10	77	62.6
11–20	35	28.5
≥21	11	8.9
Primary practice setting		
Community hospital	82	66.7
Academic hospital	32	26.0
Private clinic	9	7.3
Number of suspected DDH cases examined in past years		
0	53	43.1
1–3	44	35.8
3–10	19	15.4
>10	7	5.7
Total	123	100.0

*Other specialties include: Internal Medicine, Emergency Medicine, Orthopedics, Gynecology, Dermatology, Ophthalmology, Anesthesiology, Radiology, Preventive Medicine, and Respiratory Therapy.

Overall, knowledge among healthcare professionals regarding DDH management was suboptimal. As shown in Table 1, 44.7% of participants demonstrated poor knowledge, 36.6% exhibited moderate knowledge, and only 18.7% demonstrated good knowledge. Knowledge scores ranged from 18.18% to 100%, with a mean of 54.62% ±20.28% (Figure 1).

Table 2 presents the distribution of knowledge levels according to clinical and professional characteristics. Among general practitioners and family physicians, 54.5% demonstrated poor knowledge, 66.7% moderate knowledge, and 56.5% good knowledge. Among participants from other specialties, 45.5% had poor knowledge, 33.3% moderate knowledge, and 43.5% good knowledge. The association between clinical occupation and knowledge level was not statistically significant (p=0.449). Participants with ten years or less of experience had the highest proportion of poor knowledge (69.1%), while those with 11–20 years of experience showed lower rates of poor knowledge (23.6%) and proportionally higher good knowledge (39.1%). Despite these trends, no significant difference was observed across experience groups (p=0.533). The setting of work also demonstrated no statistically significant association with knowledge level (p=0.910), nor did the number of previously examined DDH cases (p=0.770).

Table 2: Total knowledge grades of healthcare professionals regarding DDH management.

Knowledge level	N	%
Poor knowledge	55	44.7
Moderate knowledge	45	36.6
Good knowledge	23	18.7
Min–max	18.18–100%	
Mean±SD	54.62±20.28%	

SD: Standard deviation

Table 3 presents the distribution of knowledge levels according to clinical and professional characteristics. Among general practitioners and family physicians, 54.5% demonstrated poor knowledge, 66.7% moderate knowledge, and 56.5% good knowledge. Among participants from other specialties, 45.5% had poor knowledge, 33.3% moderate knowledge, and 43.5% good knowledge. The association between clinical occupation and knowledge level was not statistically significant (p=0.449). Participants with ten years or less of experience had the highest proportion of poor knowledge (69.1%), while those with 11–20 years of experience showed lower rates of poor knowledge (23.6%) and proportionally higher good knowledge (39.1%). Despite these trends, no significant difference was observed across experience groups (p=0.533). The setting of work also demonstrated no statistically significant association with knowledge level (p=0.910), nor did the number of previously examined DDH cases (p=0.770).

Table 4 summarizes screening behaviors, diagnostic preferences, and training status among participants. Regarding DDH screening, only 30.1% of participants reported always examining infant hips, while 38.2% did so only sometimes, 17.9% rarely, and 13.8% never. Furthermore, 46.3% did not perform hip assessments at every well-baby visit. Clinical examination was the most commonly employed diagnostic method (60.2%), followed by ultrasound (20.3%) and X-ray (19.5%). Access to ultrasonography was unavailable to 42.3% of participants. Among those ordering ultrasound, 46.3% reported that examinations were performed by technicians specifically trained in dynamic DDH evaluation, while 27.6% used technicians without specific DDH training and 17.9% relied on orthopedic surgeons (Figure 2).

With respect to formal training, more than half of participants had not received training in DDH risk factor recognition (52.0%) or in performing clinical diagnostic tests (51.2%).

As shown in Table 5, the most commonly cited referral triggers were positive radiograph or ultrasound findings (37.4%) and hip click (33.3%), while less evidence-based criteria such as family request accounted for 7.3%. A majority of respondents (61.8%) reported the availability of a standard DDH care pathway at their institution, and 82.1% considered such pathways effective. Notably, 86.2% endorsed the utility of implementing a standardized evaluation protocol for DDH (Figure 3).

Table 6 presents participants' awareness of community education, risk factors, clinical presentation, and treatment. While 35.8% agreed that community awareness of DDH is currently sufficient, 45.5% either disagreed or remained neutral. Regarding gender-based risk, 51.2% correctly identified females as being at higher risk, while 24.4% perceived no gender difference and an equal proportion incorrectly identified males (Figure 4). With respect to screening timing, 58.5% correctly recommended ultrasound use within the first three months of life (Figure 5). Awareness of DDH risk factors was varied: 30.9% identified only one correct risk factor, 31.7% identified two, 22.8% identified three, and only 14.6% correctly identified all four established risk factors. The majority (69.1%) believed that additional awareness campaigns are needed. Regarding clinical presentation, 45.5% identified leg abnormality as the primary feature, followed by limp (30.1%), hip abnormality (17.1%), and pain (7.3%) (Figure 6). In terms of early treatment, 48.0% correctly identified bracing as the preferred intervention, while 17.9% cited surgery, 17.1% cited range of motion exercises, and 17.1% were unable to identify an appropriate management strategy (Figure 7).

Table 3: Association between participants' knowledge level and their clinical and professional characteristics.

Variables	Poor N (%)	Moderate N (%)	Good N (%)	Total N (%)	P value
Clinical occupation					
GP/family physician	30 (54.5)	30 (66.7)	13 (56.5)	73 (59.3)	0.449
Other specialties	25 (45.5)	15 (33.3)	10 (43.5)	50 (40.7)	
Years of experience					
≤10	38 (69.1)	28 (62.2)	11 (47.8)	77 (62.6)	0.533
11–20	13 (23.6)	13 (28.9)	9 (39.1)	35 (28.5)	
≥21	4 (7.3)	4 (8.9)	3 (13.0)	11 (8.9)	
Setting of work					
Academic hospital	15 (27.3)	12 (26.7)	5 (21.7)	32 (26.0)	0.910
Community hospital	35 (63.6)	30 (66.7)	17 (73.9)	82 (66.7)	
Private clinic	5 (9.1)	3 (6.7)	1 (4.3)	9 (7.3)	
No. of suspected DDH cases examined					
0	22 (40.0)	20 (44.4)	11 (47.8)	53 (43.1)	0.770
1–3	22 (40.0)	15 (33.3)	7 (30.4)	44 (35.8)	
3–10	7 (12.7)	9 (20.0)	3 (13.0)	19 (15.4)	
>10	4 (7.3)	1 (2.2)	2 (8.7)	7 (5.7)	

*Statistically significant at p≤0.05; Chi-square test

Table 4: Screening practices, diagnostic methods, and formal training in DDH among healthcare professionals.

Variables	Response	N	%
A. Screening practices			
Do you examine infant hips for DDH for all infants you see?	Always	37	30.1
	Sometimes	47	38.2
	Rarely	22	17.9
	Never	17	13.8
Do you examine infant hips at each well-baby check?	Yes	66	53.7
	No	57	46.3
B. Diagnostic methods			
Which diagnostic method do you use?	Clinical examination	74	60.2
	Ultrasound	25	20.3
	X-ray	24	19.5
Do you have easy access to ultrasound at your facility?	Yes	71	57.7
	No	52	42.3
Who usually performs the ultrasound?	US technician trained in dynamic DDH evaluation	57	46.3

Continued.

Variables	Response	N	%
	US technician not trained in dynamic DDH evaluation	34	27.6
	Orthopedic surgeon	22	17.9
	Primary care physician/pediatrician	10	8.1
C. Formal training			
Have you had formal training on DDH screening and risk factors?	Yes	59	48.0
	No	64	52.0
Have you had formal training on per-forming clinical tests to diagnose DDH?	Yes	60	48.8
	No	63	51.2

Table 5: Knowledge about management protocols and referral criteria for DDH.

Variables	Response	N	%
Factors/findings warranting referral to orthopedic surgeon	Positive radiograph or ultrasound	46	37.4
	Hip click	41	33.3
	Presence of a risk factor	17	13.8
	Hip clunk	10	8.1
	Family request	9	7.3
Does your facility have a standard DDH care pathway?	Yes	76	61.8
	No	47	38.2
Do you believe the care pathway is effective?	Yes	101	82.1
	No	22	17.9
Would implementation of a standardized DDH protocol be useful?	Yes	106	86.2
	No	17	13.8

Table 6: Community awareness, risk factor knowledge, clinical presentation, and early treatment of DDH.

Variables	Response	N	%
A. Community awareness and risk factors			
Is community awareness about DDH currently sufficient?	Agree	44	35.8
	Neutral	31	25.2
	Disagree	25	20.3
	Strongly agree	23	18.7
Which gender is associated with higher DDH risk?	Female	63	51.2
	Male	30	24.4
	No difference	30	24.4
When can hip ultrasound be used to screen for DDH?	During the first 3 months of age	72	58.5
	After 3 months of age	33	26.8
	No role for ultrasound	18	14.6
Number of correct DDH risk factors identified	One risk factor	38	30.9
	Two risk factors	39	31.7
	Three risk factors	28	22.8
	All four risk factors	18	14.6
Do we need more DDH awareness campaigns?	Need more campaigns	85	69.1
	There are enough campaigns	19	15.4
	There are no campaigns	19	15.4
B. Clinical presentation and early treatment			
How do you think a child with DDH will present?	Leg abnormality	56	45.5
	Limp	37	30.1
	Hip abnormality	21	17.1
	Pain	9	7.3
How is DDH treated when diagnosed early?	Bracing	59	48.0
	Surgery	22	17.9
	Range of motion exercises	21	17.1
	Do not know	21	17.1

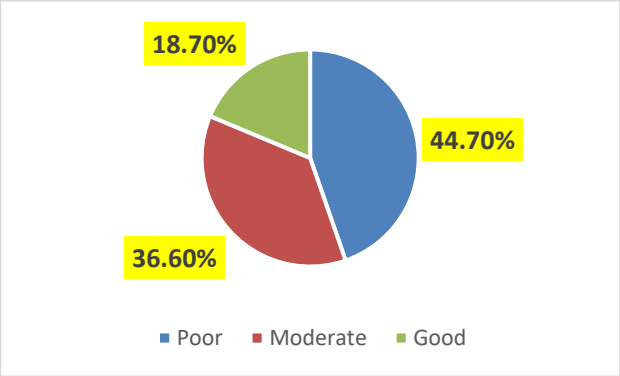

Figure 1: Knowledge grade distribution.

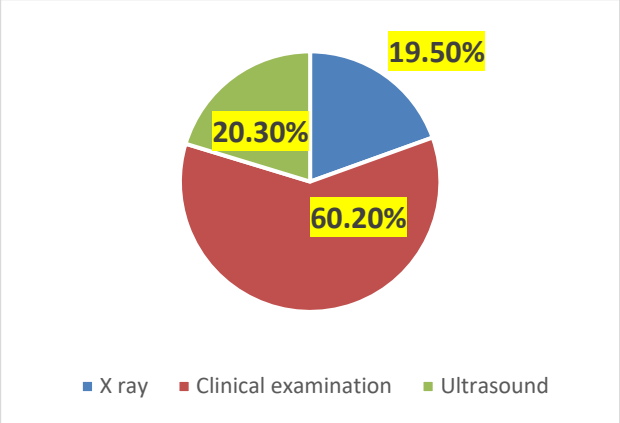

Figure 2: Diagnostic methods used.

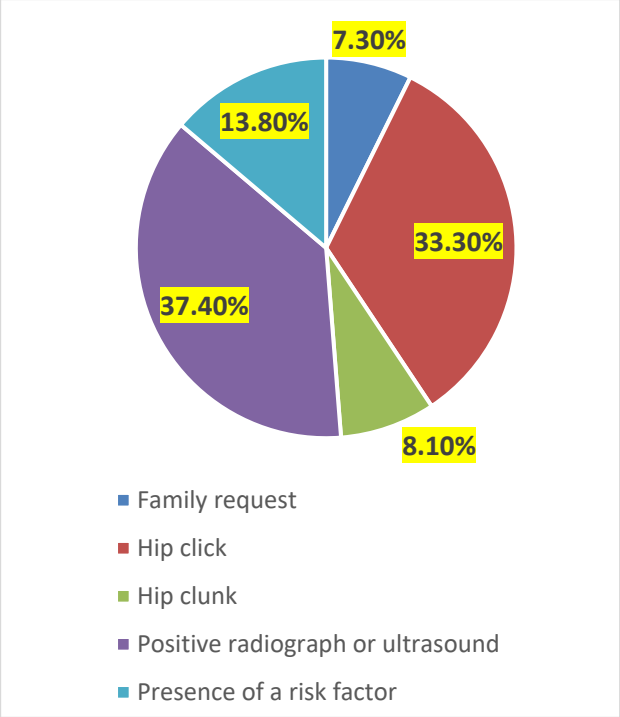

Figure 3: Referral criteria.

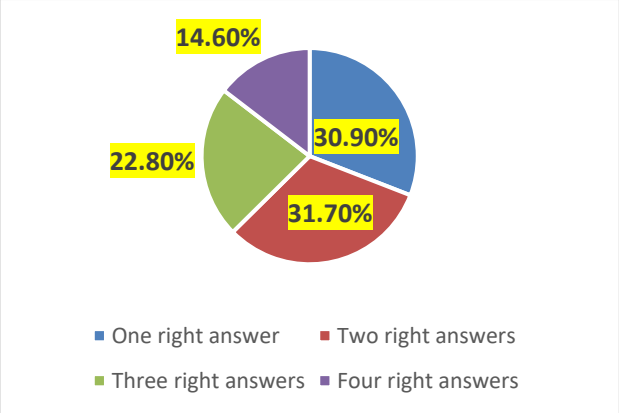

Figure 4: Gender and DDH risk perception.

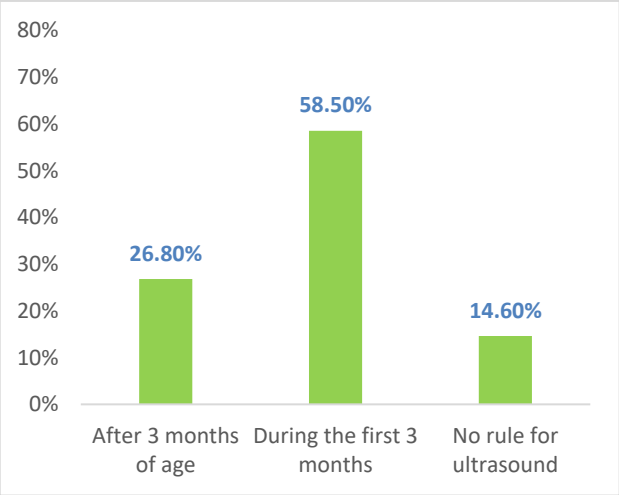

Figure 5: Ultrasound screening timing.

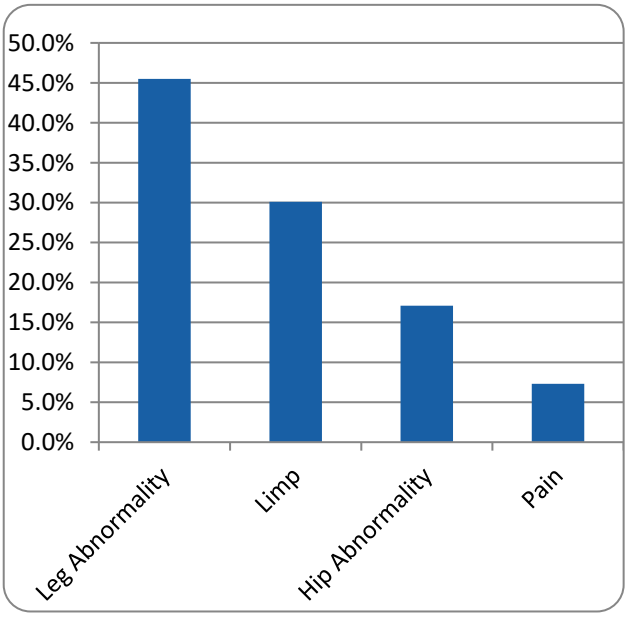

Figure 6: Perceived clinical presentation.

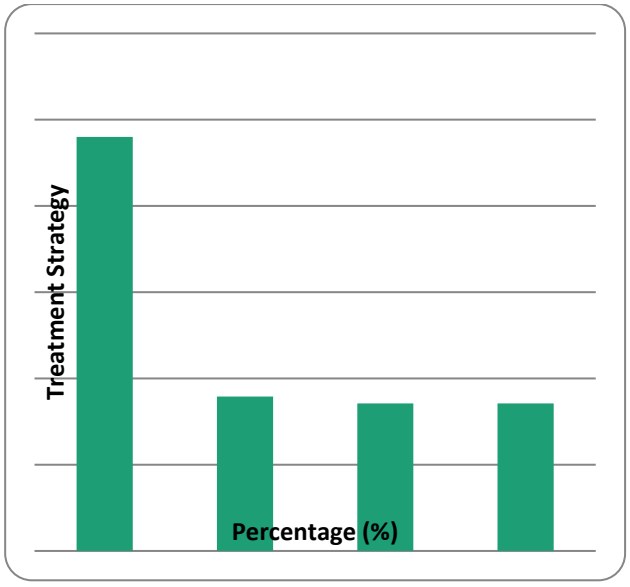

Figure 7: Early treatment approaches.

DISCUSSION

This study reveals critical insights into the current state of knowledge and clinical practices regarding DDH among healthcare professionals in Medina, Saudi Arabia. Despite the known burden of DDH and its long-term complications if left untreated, the findings indicate that a substantial proportion of healthcare providers lack adequate knowledge and formal training in DDH screening and management. With only 18.7% of participants demonstrating good knowledge, and nearly 45% falling into the poor knowledge category, the study underscores a pressing need for targeted educational interventions. The absence of statistically significant associations between knowledge levels and key demographic or professional characteristics—such as occupation, years of experience, or number of DDH cases encountered—suggests that knowledge deficits are widespread across different healthcare sectors. This aligns with prior studies that emphasize the variability in DDH awareness and highlight the importance of standardized, formal training regardless of clinical background.[23,24]

Screening practices also varied widely, with only 30.1% of participants consistently examining infant hips, and 46.3% failing to do so at each well-baby visit. These inconsistencies may contribute to the high rate of delayed DDH diagnoses previously reported in Saudi Arabia—estimated at over 30%.[25] Moreover, despite the recognized value of ultrasonography in early detection, 42.3% of respondents lacked access to this diagnostic modality. This finding points to both infrastructural limitations and the need for broader dissemination of national screening protocols and imaging guidelines. Formal training appears to be a critical factor: over half of participants had not received training in DDH risk factor recognition or in performing clinical diagnostic tests. This deficiency likely contributes to inconsistent referral patterns. Although most participants recognized positive ultrasound or radiograph findings and hip clicks as referral triggers, others cited less evidence-based criteria, such as family requests.

Encouragingly, the majority of respondents (86.2%) endorsed the utility of standardized care pathways, and over two-thirds supported the need for community awareness campaigns. This positive attitude suggests a strong foundation for policy implementation. The knowledge gaps identified in this study mirror similar findings in international contexts, where lack of structured education and absence of uniform screening guidelines have been associated with late diagnoses and suboptimal outcomes.[26,27] This study's findings also reveal significant misconceptions about DDH's clinical presentation and early treatment. While 45.5% correctly identified leg abnormalities as a presenting feature, 17.1% could not identify any form of management. Only 48% correctly reported bracing as the preferred early intervention, highlighting the urgent need for continuing medical education (CME) modules focused on pediatric orthopedic conditions.

Limitations

While this study provides precious information into the current state of DDH-related information among healthcare professionals in Medina, several limitations should be acknowledged. First, the study relied on self-reported data, which may be subject to response bias, particularly social desirability bias, wherein respondents may over report wanted behaviors such as screening practices. Second, although the sample included a range of healthcare roles, some professional subgroups (e.g., orthopedic specialists) were underrepresented, potentially limiting subgroup comparisons and the generalizability of the findings across all clinical specialties.

Additionally, the cross-sectional design of the study precludes causal inference. While formal training was strongly associated with higher knowledge levels, it is not possible to know whether the training directly caused the improvement without longitudinal data. Furthermore, the composite knowledge score, although based on evidence-based guidelines, may not fully capture the desired understanding required for DDH diagnosis and management in clinical settings.

Furthermore, logistic regression analysis was not performed, as bivariate analyses revealed no statistically significant associations between the predictor variables and knowledge level, and the sample size was considered insufficient to support a reliable multivariate model given the number of candidate predictors.

Lastly, this study was confined to healthcare professionals in Medina, which may limit its applicability to other regions in Saudi Arabia with different institutional policies, educational infrastructure, or patient populations.

CONCLUSION

This cross-sectional study highlights a critical gap in knowledge and inconsistency in clinical practices regarding DDH among healthcare professionals in Medina, Saudi Arabia. The findings emphasize that despite DDH being a well-documented and preventable cause of long-term morbidity, healthcare providers exhibit suboptimal awareness and varied screening behaviors. The lack of formal training, inconsistent access to ultrasonography, and non-standardized referral practices further compound the risk of missed or delayed diagnoses.

Recommendations

To address these challenges, the study recommends: implementing region-wide standardized screening protocols, integrating DDH-focused modules into CME programs and undergraduate medical curricula, enhancing diagnostic infrastructure, particularly access to trained ultrasonographers and imaging tools, and launching community-based awareness campaigns to promote early screening and parental vigilance.

Ultimately, these efforts are essential to ensure timely diagnosis, appropriate referral, and effective treatment of DDH, thereby reducing the burden of orthopedic disability in the Saudi pediatric population.

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