

Swaddling as a Risk Factor for Developmental Dysplasia of the Hip: Perception and Knowledge of Family Medicine and Pediatric Residents

Majed N. Alosaimi^{1,2,3}, Ahmed H. Kaneetah^{1,2}, Meshari M. Alzhrani^{2,4}, Sara G. Qadi^{1,2}, Wael H. Alrammaal^{1,2}

¹Department of Surgery, Orthopedic Division, Ministry of the National Guard-Health Affairs, ²King Abdullah International Medical Research Center, ³King Saud bin Abdulaziz University for Health Sciences, ⁴Department of Family Medicine, Ministry of the National Guard-Health Affairs, Jeddah, Saudi Arabia

ABSTRACT

Objectives: Several risk factors were associated with developmental dysplasia of the hip (DDH); however, the most common modifiable risk factor is swaddling. Swaddling is a common practice in Saudi Arabia with different unsafe techniques. The aim of our study is to evaluate the awareness and perception of family medicine and pediatric residents of swaddling techniques and their relations to DDH and to look for the effectiveness of an educational intervention on changing their attitude and perception regarding this topic. **Methods:** This cross-sectional study targeted family medicine and pediatric residents. Each of the participants received a validated questionnaire that was filled before and after a presentation by a pediatric orthopedic consultant regarding different aspects of DDH. **Results:** The study included 61 residents. Participants' age ranged from 25 to 30 years. There was a significant correlation between the prelecture scores and the practicing period of the physicians ($P = 0.003$). Results showed that participants' mean knowledge score before the intervention was 3.801 ± 2.18 (out of 8) while after the intervention increased to 6.903 ± 1.12 . **Conclusion:** More than half of the participants lacked the knowledge about swaddling and DDH. The educational intervention significantly increased their knowledge and perception. This clearly means that first-line physicians encountering DDH patients need educational sessions on this topic to manage them safely and educate them about safe swaddling techniques.

Keywords: Awareness, developmental dysplasia of the hip, family medicine residents, pediatric residents, Saudi Arabia, swaddling

INTRODUCTION

Developmental dysplasia of the hip (DDH) is a term used to describe the structural abnormalities that involve the growing hip, which might lead to dislocation or instability of the hip joint.^[1,2] The incidence of DDH in Saudi Arabia varies greatly in different cities. It ranges between 3.8 and 36.5 cases per 1000 according to different studies in different years.^[3-5] Several nonmodifiable risk factors were associated with DDH including family history, female gender, breech presentation, and firstborn child; however, the most common modifiable risk factor is swaddling.^[1,2] According to one prospective study done in Turkey, swaddling was associated with DDH more than all other risk factors, including family history, female gender, breech presentation, and firstborn child.^[6]

Swaddling represents a practice of wrapping a baby in a blanket so that limb movement is snugly restricted to provide warmth and security. Swaddling is a traditional practice among different

societies with different techniques.^[7] According to a systematic review, DDH can be promoted by swaddling, especially when the legs are not free to bend and flex.^[7] The International Hip Dysplasia Institute and the Pediatric Orthopedic Society of North America recommended that infant hips should be positioned in slight flexion and abduction during swaddling

Address for correspondence: Dr. Majed N. Alosaimi, Department of Surgery, Orthopedic Division, Ministry of the National Guard-Health Affairs, Jeddah, Saudi Arabia. King Abdullah International Medical Research Center, Jeddah, Saudi Arabia. King Saud bin Abdulaziz University for Health Sciences, Jeddah, Saudi Arabia. E-mail: majedalosaimi@gmail.com

Received: 16-05-2020

Revised: 13-06-2020

Accepted: 24-06-2020

Published Online: 17-08-2020

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Alosaimi MN, Kaneetah AH, Alzhrani MM, Qadi SG, Alrammaal WH. Swaddling as a risk factor for developmental dysplasia of the hip: Perception and knowledge of family medicine and pediatric residents. *J Musculoskelet Surg Res* 2020;4:218-22.

Access this article online

Quick Response Code:



Website:
www.journalmsr.com

DOI:
10.4103/jmsr.jmsr_54_20

with the knees in slight flexion.^[8] One of the most common techniques of swaddling used is with extended hips and knees, which is almost the opposite of Pavlik harness, the standard initial treatment of DDH worldwide.^[9-11]

A very high prevalence of hip dislocation was shown in different populations that used swaddling. For example, in some tribes of Native American Indians where they used to carry their babies on a "cradle board" with the hips and knees strapped in forced extension and adduction position. Similarly, in Japan, swaddling was a common practice before 1965, and the incidence of DDH was 1.5%–3.5%. This incidence decreased down to 0.2% when they implemented a national program to stop swaddling.^[8]

In Saudi Arabia, it is still a common practice and is known with different names, including "Mihad," "Tagmeet," and "Kawfala." Although the number of cases presented with DDH is considered high and the swaddling practice is very popular in Saudi Arabia, the research publications in this field are extremely limited. One study in Saudi Arabia found that swaddling was used in almost 71% of the patients with DDH.^[12] They found that only 25% of those with DDH associated with swaddling were discovered in the 1st month of life. Moreover, only 45% of all the cases were discovered by the family when they noticed an abnormality. These findings demonstrate the importance of swaddling as a risk factor and the lack of the public awareness about its complications.

Only one cross-sectional study found in Saudi Arabia aimed at evaluating the perception of mothers about swaddling techniques. They found that 91% of mothers used swaddling and most of them learned the technique from their relatives and only 4% were trained by a healthcare provider.^[13] Family physicians and pediatricians are usually the ones responsible for neonatal screening, well-baby clinic, and education.^[2,11] Residents, in general, are usually the first-line encounter with patients. According to a study done in Los Angeles, USA, <50% of pediatricians educate parents of newborns about swaddling risks if not done properly.^[14]

Up to our knowledge, no local study has evaluated the effectiveness of an educational intervention on changing the attitude and perception of swaddling in relation to DDH. Thus, the aim of our study was to evaluate the awareness and perception of family medicine and pediatric residents toward swaddling techniques and their relationships to DDH. Moreover, we aimed to look for the effectiveness of an educational intervention on changing their attitude and perception regarding this topic.

MATERIALS AND METHODS

This cross-sectional study was conducted in January 2019. The study aimed to assess the perception of family medicine and pediatric residents toward swaddling techniques and their relationships to DDH. The inclusion criteria for both groups were being a resident at the National Guard Hospital,

Jeddah. Respondents were targeted during their scheduled mandatory weekly teaching. Each of the participants received a validated questionnaire composed of 17 questions to be filled in 10 min. Then, papers were collected in sealed envelopes in front of them. After that, a 20-min presentation was provided by a pediatric orthopedic consultant. The presentation was a PowerPoint presentation that included different aspects of DDH, including clinical presentation, risk factors including swaddling, diagnosis, and management. Pictures were provided during the presentation to illustrate the correct and wrong swaddling techniques. Next, they were provided with another questionnaire, with the same knowledge questions that they filled before the presentation and were given 5 min to answer. Then, prepresentation and postpresentation questionnaires were collected for every participant in a sealed envelope. The same steps were done for both groups; family medicine residents and pediatric residents.

The questionnaire was adapted mainly from two studies' questionnaires.^[13,15] The face and construct validity of the questionnaire and the presentation were addressed through consultation with three pediatric orthopedic consultants from National Guard Hospitals in Riyadh and Jeddah, Saudi Arabia. Then, the questionnaire was modified according to their recommendations. After that, a pilot study was done on 11 orthopedic residents in the National Guard Hospital, Jeddah, Saudi Arabia, to explore if there were any remaining issues in the questionnaire. The questionnaire was further modified according to the difficulties that the participants faced. The presentation was reviewed by the same reviewers and modified accordingly.

The final questionnaire developed consisted of three sections. The first section was about the respondents' demographical data, which included questions regarding their age, gender, specialty (i.e., family medicine or pediatrics), practicing period, marital status, if they have a family history of DDH, or if they have children. The second section consisted of two parts. The first part will be filled if the respondent has children. It was composed of three multiple-choice questions: whether their children were diagnosed with DDH, or they practiced swaddling on them in addition to the method of the swaddling. The second part was a question about if they have ever done swaddling to any child, in addition to the method of the swaddling they practiced. The third section consisted of eight multiple-choice questions that assessed the knowledge of respondents toward DDH and swaddling as a risk factor.

All statistical procedures were performed using Statical package for IBM SPSS Statistics for Windows, Version 18.0. Chicago: SPSS Inc. IBM Corp. Quantitative variables were reported as a mean and standard deviation if normally distributed data or median and 25th and 75th percentile if data were skewed, while qualitative variables were reported as frequency and percentages. Analyses for associations between variables were performed using the Student's *t*-test and analysis of variance test. Paired *t*-test and McNemar's test were used

to compare the scores difference between preintervention and postintervention results. Values <0.05 were considered statistically significant, with a confidence interval of 95%.

RESULTS

Sixty-one participants were included in the study. Participants' age ranged from 25 to 30 years, with a median age of 26 years (interquartile range) = 2 years. Females presented 65.6% (40/61) of the total participants. In terms of marital status, 67.2% (41/61) were singles, 27.9% (17/61) were married, and 3.3% (2/61) were divorced. Family medicine residents constituted 63.9% (39/61) of the participants, while 36.1% (22/61) were pediatric residents. Table 1 illustrates the demographic characteristics of each specialty.

Of the total participants, only 11.5% (7/61) had children; neither of these children was diagnosed with DDH nor had a family history with the disease. About 71.4% (5/7) of the parents had practiced swaddling on their children, and 34.4% (21/61) of the total participant had previously practiced it on other children. Table 2 summarizes the used swaddling techniques. There was no correlation between practicing swaddling on their children or any child and their knowledge score.

There was a significant correlation between the prelecture scores and the practicing period of the physicians ($P = 0.003$). Pediatricians had higher prelecture knowledge scores than family physicians ($P = 0.033$). Further, there was a weak positive correlation between the age and the knowledge scores ($r^2 = 0.86$, $P = 0.031$) [Table 3].

Knowledge score was calculated out of 8, with each question counts for 1. Results showed participants' mean knowledge score before the intervention was 3.801 ± 2.181 , while after the intervention, the mean score increased to 6.903 ± 1.121 . A repeated-measure t -test found this difference to be statistically significant, $t = 11.683$, $df = 60$, and $P < 0.001$. Knowledge questions were evaluated each one separately before and after the intervention, with a $P < 0.001$ in most questions [Table 4].

DISCUSSION

Awareness regarding swaddling techniques and their relation to DDH is suboptimal among the first-line encounters to these patients, as found by our results. Almost one-third of the participants have practiced swaddling on a child, with only 42% of them using the safe technique. Our study focused on family physicians and pediatricians as they are usually the first-line patients' encounter, and generally, education about these topics should be held with them. Hence, their perception and knowledge regarding this topic are essential.

Almost 50% of the questions regarding swaddling and its relation to DDH were answered incorrectly. Participants who practice for more than 2 years in their specialty had higher scores. The higher the age of the participants, the more answers

Table 1: Demographic data

	Family physicians (<i>n</i> =39)	Pediatricians (<i>n</i> =22)
Age, median (IQR)	27.0 (1)	26 (3)
Gender		
Male	30.8% (12/39)	40.9% (9/22)
Female	69.2% (27/39)	59.1% (13/22)
Marital status		
Single	61.5% (24/39)	77.3% (17/22)
Married	33.3% (13/39)	18.2% (4/22)
Divorced	5.1% (2/39)	0% (0/22)
Practicing period (years)		
<2	51.3% (20/39)	59.1% (13/22)
Between 2 and 5	48.7% (19/22)	40.9% (9/22)
Having children		
Yes	15.4% (6/39)	4.5% (1/22)
No	84.6% (33/39)	95.5% (21/22)

IQR: Interquartile range

Table 2: Used swaddling techniques by participants

Swaddling techniques	Practiced swaddling on their children (<i>n</i> =5)	Practiced swaddling on other children (<i>n</i> =21)
Legs are straight and near each other	20% (1/5)	19% (4/21)
Tight over the upper limbs and loose over the lower limbs	60% (3/5)	42.9% (9/21)
Using a band to prevent the movement of upper and lower limbs completely	20% (1/5)	33.3% (7/21)

Table 3: Correlation between demographic data and prelecture knowledge score

Variables	Mean score \pm SD	<i>t</i> -test	<i>P</i>
Age	-	-	0.031
Gender			
Male	3.43 \pm 2.62	0.971	0.335
Female	4.00 \pm 1.92		
Specialty			
Pediatricians	4.59 \pm 2.04	2.183	0.033
Family physicians	3.36 \pm 2.16		
Marital status			
Single	3.59 \pm 2.09	1.819	0.074
Married	4.70 \pm 2.26		
Practicing period (years)			
<2	3.06 \pm 2.08	3.083	0.003
Between 2 and 5 years	4.69 \pm 2.00		
Having children			
Yes	3.43 \pm 2.64	0.480	0.633
No	3.85 \pm 2.14		

SD: Standard deviation

Table 4: Pre- and post-lecture knowledge scores

	Percentage of prelecture correct answer (n=61)	Percentage of postlecture correct answer (n=61)	P
Is it correct that instantly after delivery, the baby should be held from ankles in a head-down position and shaken to cry?	65.6% (40)	65.6% (40)	1.000
Is it useful to hold the baby from ankles in a head-down position and shake after a bath in the first 40 days?	72.1% (44)	75.4% (46)	0.832
Do you think that swaddling is related to DDH?	45.9% (28)	98.4% (60)	0.000
Do you think that swaddling is used for managing DDH?	49.2% (30)	95.1% (58)	0.000
Do you think that swaddling makes hips and knees extended and forces hip to dislocate?	37.7% (23)	82% (50)	0.000
Is it helpful to forcefully extend the hips and legs to perform massage and exercise to facilitate the movements of hips?	44.3% (27)	82.0% (50)	0.000
Do you think that swaddling is a risk factor for DDH?	32.8% (20)	100% (61)	0.000
Which of the following is the safest swaddling technique?	32.8% (20)	91.8% (56)	0.000

DDH: Developmental dysplasia of the hip

were answered correctly, which could be attributed to more practicing period. There was no difference between males and females or those who are married or not in the knowledge scores. In addition, having children was not associated with higher knowledge scores. Moreover, there was no correlation between practicing swaddling before and their knowledge scores. Interestingly, pediatric residents had higher scores than family medicine residents.

Our intervention had a significant effect on the participants' total perception of DDH and the appropriate swaddling techniques. The average score after the intervention increased to 85% compared to <50% preintervention. There was a statistically significant difference in almost all questions from preintervention to postintervention.

One study done in Almadinah Almunawwarah, Saudi Arabia, on 2631 mothers showed that only <23% knew that there are some effects of swaddling on children's hips and <37% knew the correct and safe swaddling technique.^[12] Only 32% of the participants in our study knew that swaddling is a risk factor of DDH and 100% of them learned that it is a risk factor after the lecture. Remarkably, almost 51% of the participants thought that swaddling is a treatment of DDH, which was changed significantly after the educational intervention. In addition, more than 67% of the participants were not able to choose the correct safe swaddling technique. However, after the intervention, more than 91% were comfortable and sure about the correct safe method.

These data demonstrate that first-line physicians encountering DDH patients (family physicians and pediatricians) need educational sessions regarding this topic to deal with them safely. In addition, this will give them insight into how to educate their patients about the risks of swaddling and safe swaddling practices, and hopefully, they will practice that as initial encounter as pediatric residents early after birth or as family medicine residents in the well-baby clinic as a regular follow-up with each vaccination visit.

Limitations

The limitations were being a single-center study and with a small sample size and lack of long-term assessment of the effect on knowledge or on residents' behavior.

CONCLUSION

More than half of the participants had a lack of knowledge about swaddling and its relation to DDH, and about 22% of them had practice swaddling in an unsafe method. A longer practicing period was associated with more knowledge about the topic. The educational intervention significantly increased the knowledge and perception of the participants, regarding swaddling and its relation to DDH. More than 91% of the participants were able to identify the safe practice of swaddling after the educational intervention compared to 32.8% before it. This clearly means that first-line physicians encountering DDH patients (family medicine and pediatric residents) need educational sessions on this topic to deal with them safely and educate their parents about safe swaddling techniques.

Recommendations

Educational interventions regarding swaddling and its relation to DDH are of great value and can have a huge impact on prognosis of children and worsening of the hip dysplasia. Future studies with larger sample size are recommended. Practical intervention sessions could be more helpful and a subject for future research concerning DDH and other topics.

Ethical consideration

This study was approved by the Institutional Review Board of King Abdullah International Medical Research Center, National Guard Health Affairs, Jeddah, Saudi Arabia, with Memorandum Reference No. RYD-18-417780-130171, dated July 26, 2018. Participants were consented to participate in the study.

Acknowledgment

The authors want to thank the pediatric orthopedic consultants who reviewed the questionnaire and the lecture. The authors

would also like to thank Nada Baatiah for her valuable contribution to data analysis. The authors would like to thank the participants.

Financial support and sponsorship

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of interest

There are no conflicts of interest.

Authors' contributions

MNA has contributed with concepts, design, definition of intellectual content, manuscript preparation, editing, and review. AHK and MMA have contributed with literature search, data acquisition, manuscript preparation, editing, and review. SGQ and WHA have contributed with design, data acquisition, and manuscript review. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

REFERENCES

1. Dobbe AM, Gibbons PJ. Common paediatric conditions of the lower limb. *J Paediatr Child Health* 2017;53:1077-85.
2. Souza BG, de Melo TE, Resende TM, da Silva RC, Cruz SA, de Oliveira VM. Developmental dysplasia of the hip: Do the responsible for screening know what to do? *Acta Ortop Bras* 2016;24:312-7.
3. Mirdad T. Incidence and pattern of congenital dislocation of the hip in Aseer region of Saudi Arabia. *West Afr J Med* 2002;21:218-22.
4. Al-Umran K, Ahlberg Dawodu AA, El-Mouzan MI, Ahmad FA. Neonatal screening for hip instability: Five years' experience. *Ann Saudi Med* 1988;8:425-9.
5. Khan MR, Benjamin B. Congenital hip instability in hospital born neonates in Abha. *Ann Saudi Med* 1992;12:184-7.
6. Dogruel H, Atalar H, Yavuz OY, Sayli U. Clinical examination versus ultrasonography in detecting developmental dysplasia of the hip. *Int Orthop* 2008;32:415-9.
7. van Sleuwen BE, Engelberts AC, Boere-Boonekamp MM, Kuis W, Schulpen TW, L'Hoir MP. Swaddling: A systematic review. *Pediatrics* 2007;120:e1097-106.
8. Price C, Schwend R. Improper Swaddling A Risk Factor for Developmental Dysplasia of Hip. *American Academy of Pediatrics*. 2020. Available from: <https://www.aappublications.org/content/32/9/11.1>.
9. Gargan KE, Bradley CS, Maxwell A, Moktar J, Wedge JH, Murnaghan ML, *et al.* Education of parents in Pavlik harness application for developmental dysplasia of the hip using a validated simulated learning module. *J Child Orthop* 2016;10:289-93.
10. Larson JE, Patel AR, Weatherford B, Janicki JA. Timing of Pavlik harness initiation: Can we wait? *J Pediatr Orthop* 2019;39:335-8.
11. MacEwen GD, Millet C. Congenital dislocation of the hip. *Pediatr Rev* 1990;11:249-52.
12. Kremli MK, Alshahid AH, Khoshhal KI, Zamzam MM. The pattern of developmental dysplasia of the hip. *Saudi Med J* 2003;24:1118-20.
13. Almahdi HH, Almukhlifi RA, Alahmadi RA, Hetaimish BM. Assessment of the awareness among females in Saudi Arabia about the relationship of swaddling to developmental dysplasia of the hips. *J Musculoskelet Surg Res* 2017;1:44-8.
14. Joshua YB, Erica RP, Rachel YG. Less than half of pediatricians educate parents of newborns on risks and benefits of swaddling. *Acad J Ped Neonatol* 2018;6:555756.
15. Uzel M, Ergun GU, Ekerbicer HC. The knowledge and attitudes of the primary care physicians on developmental dysplasia of the hip. *Saudi Med J* 2007;28:1430-4.