Original Article

Assessment of the Awareness among Females in Saudi Arabia about the Relationship of Swaddling to Developmental Dysplasia of the Hips

Hanan H. Almahdi, Rana A. Almukhlifi, Raha A. Alahmadi, Bandar M. Hetaimish[1]

College of Medicine, Taibah University, Almadinah Almunawwarah, [1]Department of Orthopedic Surgery, College of Medicine, University of Jeddah, Jeddah, Saudi Arabia

Abstract

Objectives: With the wide use of swaddling, there is a concern that swaddling could potentially increase the risk of developmental dysplasia of the hips (DDH). A number of epidemiological studies from around the world have confirmed the association of improper swaddling with the lower limbs in adduction and extension with an increased risk of DDH, which is one of the common disorders in Saudi Arabia. This study aims to assess the prevalence of swaddling and the awareness of the females in Saudi Arabia about the correct method of swaddling and its relationship to DDH. **Methods:** This is a cross-sectional study, conducted using an online self-reported validated questionnaire. **Results:** The study involved 2631 adult females, 61% of them have children, out of which 91.3% used swaddling. Most of the ladies learnt how to swaddle from their family or friends while only 4% learnt from the health-care providers. More than 77% of the participants are not aware of the negative effects of swaddling on children's hips and around 63% did not know the correct swaddling method. 7% of them will use swaddling even if they know that it may harm their children. **Conclusions:** Awareness level among females in Saudi Arabia is suboptimal. Health-care providers should explain swaddling effects and demonstrate the technique for hip-friendly swaddling during ante- and post-natal care and in the media to reach all future mothers.

Keywords: Awareness, dysplasia of the hips, developmental dysplasia of the hips, mehad, Saudi Arabia, swaddling

Introduction

Many mothers find the traditional practice of swaddling (mehad) is comforting, can reduce crying, and improve sleeping patterns in newborns. With the widespread use of swaddling, there is a concern among pediatricians and pediatric orthopedic surgeons that swaddling could potentially increase the risk of developmental dysplasia of the hips (DDH) and other newborns problems as Sudden Infant Death Syndrome.[1]

Several risk factors are associated with DDH including female gender, breech delivery, being the first pregnancy and a family history of DDH. However, prenatal and postnatal mechanical factors are also important.[2] A number of epidemiological studies from around the world have confirmed that the improper swaddling of infants, especially when using bands (which intensify the swaddling tightness) with lower limbs in adduction, and extension is associated with an increased risk of DDH.[3,4] In an experimental study Wang *et al*. found a significant increase in the prevalence of hip dislocation after applying surgical tape to neonatal rats to simulate the effect of straight-leg swaddling in humans.[5]

DDH is one of the common disorders in Saudi Arabia with the exact incidence rate still unknown. The only work among Saudi population was done by Mirdad[6] and showed that the incidence of dislocated hips that needed intervention was 3.5/1000 live births. However, this figure seems much less than the true incidence of hip instability and dysplasia in the country,

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Address for correspondence: Dr. Hanan H. Almahdi, College of Medicine, Taibah University, Almadinah Almunawwarah 42312-2785, Saudi Arabia.
E-mail: hanan.h.almahdi@gmail.com

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as many will go unnoticed to adolescence (present as dysplasia or subluxation) and many will correct spontaneously, especially the mild cases that had favorable circumstances.[7] In Africa, the incidence rate is 0.06/1000 live births.[8] It is notable that DDH is rare among Chinese and Nigerians newborns where infants in these cultures are carried with hips in abduction position, which is the opposite of the swaddling position.[6,9,10] DDH is also very rare in countries such as Thailand, North Korea, and Sri Lanka where swaddling is not used.[11,12] In Japan, at a time, when traditional swaddling was used to keep the newborn's lower limbs in extension, the incidence of DDH was around 5%. A public campaign to switch to wrapping techniques that encouraged hip flexion and abduction led to DDH rates falling to less than 0.4%.[13] In Qatar, the incidence of sonographic hip dysplasia was 20%, which was dropped to 6% after implementation of an awareness program demonstrating the risks of swaddling.[14]

The importance of swaddling comes from the fact that increasing the incidence of DDH can lead to degenerative hip disease which is a leading cause of early arthritis of the hip. In Norway, it accounts for 20% of patients requiring total hip replacement in patients younger than 40 years.[15]

This study aims to assess the prevalence of swaddling and the awareness of the females in Saudi Arabia regarding swaddling and its relationship to DDH. This might help in modifying improper practices and encouraging a hip-friendly swaddling, which will probably lead to a significant decrease in the incidence of DDH in Saudi Arabia.

Subjects and Methods

This is a cross-sectional study, conducted through an online self-reported Arabic questionnaire, consisted of two sections. The first section dealt with the sociodemographic characteristics of the participants (age, education, and marital status) and questions to assess the use of swaddling. The second section explored the participants' awareness of the relationship between swaddling and DDH, the correct way to swaddle, and a question to figure out whether or not they would use swaddling even if they knew about its risks. The validation process was performed through sending it to six pediatric orthopedic consultants for review. The questionnaire was adapted according to their notes and comments. It was then used as a pilot study on 21 participants to explore if there were any remaining ambiguities in the questionnaire. The questionnaire was further modified according to the difficulties and notes of the participants until we arrived at the final questionnaire, which was used for the current study. Ethical approval was obtained from the Research Ethics Committee of the College of Medicine. The questionnaire was received by 2733 females above 18 years of age, randomly selected through a process of E-mailing and electronic texting of the online link of the questionnaire to the candidates. A number of 102 of the candidates did not meet the criteria and were excluded. Our inclusion criteria involved all females living in Saudi Arabia above 18 years of age. We excluded all males and excluded females below 18 years of age. The data were analyzed using the Statistical Package for the Social Science program (Version 20.0, SPSS INC, Armonk, NY, USA). The Statistical analysis test used is cross-tabulation Chi-square.

Results

The study included 2631 females who satisfied the inclusion and exclusion criteria. Demographic data of the participants are shown in Table 1. About 61% of the participants (1606) have children, out of which 91.3% (1471) used swaddling. A quarter of the ladies who swaddled their babies used it for more than 4 months [Table 2]. The tightness of the swaddling was with medium strength in 77.9% of the answers (35.1% with a band, 42.8% without a band), 13.5% allowed for free movement with weak swaddling, and only 8.6% swaddled their children strongly with a band to make the legs straight. The

Table 1: Demographic data

	Number of respondents (%)
Age (years)	
18-25	972 (36.9)
26-35	878 (33.4)
36-40	354 (13.5)
41-45	220 (8.4)
Older than 46	207 (7.9)
Marital state	
Single	863 (32.8)
Married	1652 (62.8)
Divorced	95 (3.6)
Widow	21 (0.8)
Education level	
Without a certificate	31 (1.2)
Elementary	46 (1.7)
Intermediate	72 (2.7)
High school	446 (17.0)
University	1685 (64.0)
Higher education	351 (13.3)
Family income	
<5000	411 (15.62)
From 5000-10,000	860 (32.69)
From 10,000-15,000	532 (20.22)
>15,000	828 (31.47)

Table 2: Duration of swaddling

	Number of respondents (%)
Duration of swaddling	
<1 month	91 (6.2)
1 month	181 (12.3)
2 months	293 (19.9)
3 months	291 (19.8)
4 months	241 (16.4)
>4 months	374 (25.4)

duration of swaddling was 1–5 h/day in 40% of the answers. In addition, 49.5% of respondents swaddled for 6–18 h/day while the rest (10.5%) used it for more than 18 h/day. Most of the respondents (92.7%) learnt how to swaddle from their families or friends, with only 4% learning from a health-care provider. The participants' awareness of the risk of swaddling and the correct method of swaddling is shown in Table 3. A 6.9% of the participants said that they would use swaddling even if they knew that it may cause harm to their children [Table 4]. Tables 5 and 6 shows the relationship between ages and education level of the participants and the use of swaddling after knowing its negative effects.

Table 3: Awareness of the participants regarding the relationship of swaddling to developmental dysplasia of the hips

	Number of respondents (%)
Swaddling can cause damage to the bones and joints of the child	
Agree	583 (22.2)
Disagree	824 (31.3)
Don't know	1223 (46.5)
Swaddling can lead to dislocation of the hip joint	
Agree	431 (16.4)
Disagree	879 (33.4)
Don't know	1320 (50.2)
The correct way to swaddle	
The legs must be straight and near each other	1123 (42.7)
Tight over the upper limb and loose over the lower limb allowing the flexion and movement of the legs	968 (36.8)
Using band to prevent the movement of upper and lower limbs completely	540 (20.5)
DDH is less common in countries where swaddling is not used	
Yes	410 (15.6)
No	273 (10.4)
Don't know	1947 (74.0)
Carrying the baby in a way that separates the legs will decrease the chance of DDH	
Yes	575 (21.9)
No	554 (21.1)
Don't know	1502 (57.1)

DDH: Developmental dysplasia of the hip

Table 4: Use of swaddling after knowing its negative effects

If you know that swaddling can cause harm to your baby, will you use it?	Number of respondents (%)
Yes	182 (6.9)
No	2200 (83.6)
I don't know	246 (9.4)
Didn't answer	3 (0.1)
Total	2631 (100)

Discussion

Our findings suggest that the awareness of the correct method for swaddling and the harmful effects of poor swaddling techniques is suboptimal among females in Saudi Arabia. More than 77% of the participants are not aware of the effects of swaddling on children's hips. Around 63% did not know the correct way of swaddling.

Only those with higher education had more correct answers regarding swaddling as a possible cause of negative effect on hips with a significant level of $P \leq 0.01$.

About 67% of the participants who learnt how to swaddle from the health-care providers and 69% of those who learnt from the internet learnt the correct method to swaddle (tight over the upper limbs and loose over the lower limbs allowing for flexion and abduction movement of the legs), which is much higher than other groups, especially those who learnt from their families and friends with a significant level of $P \leq 0.001$. Those with higher education and higher income had a higher percentage of knowing the correct swaddling method. Unfortunately, only four percent of the participants learnt how to swaddle from the health-care providers, and this might be the reason that most of the participants did not know how to swaddle properly as the majority (92.7%) learnt from their families and friends.

Surprisingly, around 7% of the participants answered that they will continue to use swaddling even if they learn that it can negatively affect their children's hips [Table 4]. There was significant increase of the participants who insisted to use swaddling with the increase of their ages and decrease of their educational status with $P \leq 0.001$ and $P \leq 0.01$, respectively [Tables 5 and 6].

The mean duration of swaddling was 3 months in our study, while in the Navajo Indians, the average was 10.2 months.[16] As most of the studies did not report the exact duration of swaddling, it is difficult to have a conclusion whether the duration of swaddling will increase the incidence of DDH or not.[13]

Swaddling by itself does not cause DDH, but it does harm the unstable or dysplastic hips which are not uncommon in newborns in Saudi Arabia and unfortunately, that can only be diagnosed through ultrasound hip screening. Noting that there is a deficiency in the DDH screening programs in Saudi Arabia,[2,6,14,17,18] Which means that using swaddling in newborns who were not screened for DDH is dangerous as it may change an unstable hip or mildly dysplastic one into a frank subluxation or dislocation.

It is worth noting that swaddling alone cannot affect the perfectly normal hips. It can only affect congenitally unstable or dysplastic hips, and unfortunately, that can only be diagnosed through ultrasound hip screening.[14,17] If families wish to swaddle their infants, they need to be aware of the need to allow flexion and abduction of the hips. This will

Table 5: The relationship between age of participant and the use of swaddling after knowing its negative effects

	If you know that swaddling can cause harm to your baby, will you use it?					
Age	**Yes, I will use it**	**No, I will not use it**	**I don't know**	**Total**	χ^2	***P***
18-25 years (%)	39 (1)	842 (32)	90 (3)	971 (37)	29.615	≤0.001
26-35 years (%)	65 (2)	735 (28)	76 (3)	876 (33)		
36-40 years (%)	34 (1)	282 (11)	38 (1)	354 (13)		
41-45 years (%)	19 (1)	182 (7)	19 (1)	220 (9)		
Older than 46 years (%)	25 (1)	159 (6)	23 (1)	207 (8)		
Total (%)	182 (6.9)	2200 (83.6)	246 (9.4)	2628 (99.89)		

Table 6: The relationship between education level of participant and the use of swaddling after knowing its negative effects

	If you know that swaddling can cause harm to your baby, will you use it?					
Education level	**Yes, I will use it**	**No, I will not use it**	**I don't know**	**Total**	χ^2	***P***
Without certificate (%)	4 (0)	27 (1)	0	31 (1)	25.896	≤0.01
Elementary (%)	8 (0)	35 (1)	3 (0)	46 (2)		
Intermediate (%)	11 (0)	55 (2)	6 (0)	72 (3)		
High school (%)	38 (1)	368 (14)	39 (1)	445 (17)		
University (%)	101 (4)	1415 (54)	167 (6)	1683 (64)		
Higher education (%)	20 (1)	300 (11)	31 (1)	351 (13)		
Total (%)	182 (6.9)	2200 (83.6)	246 (9.4)	2628 (99.89)		

provide protection for the safe development of hips or at least screen the hip with ultrasound to exclude dysplasia. Physicians should ask about swaddling practices, inform the families about the dangers of swaddling and pay close attention to the hip examination of infants who are tightly swaddled, especially when there are other risk factors.

Knowing the level of population awareness and practice allows us to address the problem more effectively and raise the awareness level, which will hopefully lead to a significant decrease in DDH incidence in Saudi Arabia as seen in the Japanese and the Qatari campaigns that managed to reduce the incidence of DDH in their countries.[13,14]

One subject that remains to be explored is the attitude and the level of awareness among those primary health-care providers who have direct contact with the mothers as they could play an important role in teaching new mothers.

The limitation of our study was mainly the limited sampling and respondent availability as we used an online questionnaire. Online questionnaire was used to ease the delivery of the questionnaire knowing that it would cause some inherent bias for the highly educated respondents. However, we believe that in these days, people with low educational level are greatly engaged with the internet access through a variety of electronic devices.

Conclusions

In conclusion, the awareness level among females in Saudi Arabia is suboptimal. Health-care providers should explain swaddling effects and demonstrate the technique for hip-friendly swaddling during ante- and postnatal care and in the media to reach all future mothers.

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Conflicts of interest

There are no conflicts of interest.

Authors contributions

All authors participated in conceiving and designing the study, reviewing the literature, and collecting and analyzing the data. HHA and BMH prepared the manuscript. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript. Authors testify that all persons designated as authors qualify for authorship and have checked the article for plagiarism. If plagiarism is detected, all authors will be held equally responsible and will bear the resulting sanctions imposed by the journal thereafter.

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