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Parental knowledge & awareness about Shaken Baby Syndrome in Hail city

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ABSTRACT

Background: Shaking the infant is a common behavior caregivers do to calm the infant when crying. In some conditions, shaking might lead to a serious medical condition; Shaken baby syndrome (SBS), or abusive head trauma (AHT), which may lead to death or permanent brain damage. It is not easy to estimate the number of SBS cases because many cases are underreported or never diagnosed. Raising awareness about SBS and helping people understand the risk of violently shaking a baby will help reducing its incidence. The study assessed knowledge and awareness about Shaken Baby Syndrome among Saudi parents in Hail, Saudi Arabia. *Method:* A cross-sectional study using an online questionnaire to collect responses from eligible primary caregivers of children in Hail region. Knowledge, awareness, and practices related to SBS were recorded and statistically analyzed. *Result:* (78.6%) of the participants had poor knowledge levels, and females demonstrated significantly more 'poor' knowledge levels than males (p=0.015). 45.3% reported shaking their baby when they cry. Most of the participants (96.4%) demanded more information regarding SBS, and most preferred healthcare staff to be the source of such data (82.3%). *Conclusion:* A public health primary prevention and intervention approach that educates caregivers and society about normal infant development and the importance of early increased infant crying can avoid AHT and other forms of infant maltreatment.

Keywords: Abusive head trauma, Shaken baby syndrome, prevention, child abuse.

1. INTRODUCTION

Shaken baby syndrome (SBS) or Abusive head trauma (AHT) is a type of physical abuse that causes head injuries via rotational shearing forces (Christian and block, 2009). SBS is a condition that can cause significant brain damage and is more common among infants under the age of one year owing to their prolonged crying and relative ease of shaking. Injuries associated with SBS are documented in children as old as five years old (American

Academy of Pediatrics, 2001). It develops with recurrent acceleration and deceleration mechanisms, which can cause serious health issues and even cause fatality and extensive axonal injury, these stresses rupture bridging veins, resulting in brain hemorrhage (Cartocci et al., 2021). Clinical signs vary depending on the severity of the injury. Among the symptoms are the symptoms of lethargy, irritability, retinal hemorrhages, and tight or enlarged fontanelles (Keenan et al., 2003). A mild injury may cause vague clinical signs while a severe injury can present as a shocked, unconscious, convulsing child (Harding et al., 2004).

Excessive crying, often in response to parental tensions driven by factors such as workplace and other socioeconomic issues, is the most likely cause of SBS. Injuries associated with SBS are eye injuries that present as retinal hemorrhages and skeletal injuries. Many cases of SBS go unreported and, or undiagnosed, it is challenging to estimate the actual annual incidence rate. It is reported that three or four children in the United States suffer a severe or deadly brain injury every day due to AHT (Keenan et al., 2004). A multidisciplinary approach is essential for diagnosing SBS since it represents a medical, forensic, and social challenge (Maiese et al., 2021). Poor awareness and knowledge of shaken infant syndrome been shown in prior investigations (Foley et al., 2013; Mann et al., 2015; Berthold et al., 2019; Marcinkowska et al., 2021). Raise people's awareness levels regarding SBS from a public health is essential.

Parents and caregivers should be aware to the risks of shaking an infant violently, as well as its causative factors, symptoms, and preventative measures. Increase in public understanding may lead to a decline in the incidence of SBS among infants (Starling et al., 2004). According to previous conducted studies, young mothers, full-time maternal work, later attendance for health checkups, and primiparity were possible risk factors for infantile shaking. Diversity, mixed feeding, postpartum depression, and a perceived more significant amount of infant crying are contributory factors. Studies done in other areas of the world, including Saudi Arabia, showed that most parents do not know about normal infant crying (Alshahrani et al., 2018; Marcinkowska et al., 2021; Gao et al., 2021; AlOmran et al., 2022). Most stated the need for further information, such as techniques to soothe the infant, knowledge, and prevention of SBS. Study done to assess parental knowledge and awareness about Shaken Baby Syndrome in Saudi Arabia.

2. MATERIALS AND METHODS

This is a cross sectional study conducted in Hail Saudi Arabia in the period from 1st September to the end of November 2022, to assess the level of awareness about SBS among primary caregivers of children in Hai Saudi Arabia. The University of Hail Research Ethics Committee approved the study. Electronic questionnaire written in Arabic distributed via multiple social media applications using Google survey form. The questionnaire include data about demographics, knowledge about SBS and the practice of the participants. It was revised by research experts in the University of Hail and by the Research Ethics Committee (link for google survey questionnaire: https://forms.gle/LFq1hmVcPqMuSX5T6). The study was conducted by the Helsinki Declaration's principle regarding studies involving human participants. Information kept private per Google's privacy policies. The minimum sample size to achieve a study aim with ±4 % error and a 95% confidence interval (CI) is found to be 319. A safety margin is added to the sample size to reach 350 as minimum.

Inclusion criteria

Saudi parents living in Hail region, Saudi Arabia.
Parents having at least one child.
Parents who are primary caregivers for their children.

Exclusion criteria

Nationalities other than Saudi.
Parents with psychological issues.
Parents who did not consent to report their responses.

Data analysis and management

The data were collected, reviewed, and then fed to Statistical Package for Social Sciences version 21 (SPSS: An IBM Corp, USA). General knowledge level regarding SBS assessed by summing up discrete scores for different correct knowledge items. General knowledge score categorized as poor if the participant's score was less than 70%, and good knowledge considered if the participant's score 70% or more. Distribution of frequency and percentage for study variables according to descriptive analysis. Participants' knowledge, awareness and practice regarding SBS tabulated while the general knowledge level graphed. Association

between participants' characteristics and knowledge regarding SBS carried out with Pearson's chi-square test. Statistical methods used two-tailed with an alpha level of 0.05, considering a significance value less than or equal to 0.05.

3. RESULT

In our survey, we included responses from 384 primary caregivers who fulfilled the inclusion criteria and completed the whole items in the questionnaire. Mean age of participants found to be 28.2 ± 13.7 years. 274 (71.4%) females, 162 (42.25) belonged to the age group of 21-29 years, 322 (83.9%) married, 222 (57.8%) university education, and the majority (77.65) unemployed. Number of children, 292 (76%) had 1-4 children, 72 (18.8%) had 5-7 children, and 20 (5.2%) had more than seven children (Table 1). Knowledge and awareness among participants regarding SBS shown in (Table 2). It was reported that 92 (23.9%) of the participants had heard about SBS, and 124 (32.3%) knew that shaking the baby was harmful. Consequences of SBS, the most reported they include learning difficulties (57.8%), followed by brain hemorrhage (49.5%), coma (39.6%), behavioral changes (34.4%), and blindness (27.1%). 164 participants (42.7%) believes that shaking a baby can lead to death and 276 (71.9%) agreed that SBS could be prevented.

Knowledge related to SBS calculated by adding scores for each item, where correct answer given a score of 1 and wrong answer given score of 0. The total knowledge scores converted to percentages, a score ≥70 % were considered have a good knowledge. Our analysis showed 82 (21.4%) participants had good knowledge related to SBS, whereas the majority; 302 (78.6%) had a poor knowledge (Figure 1). The relationship between various participants' characteristics and knowledge levels was evaluated (Table 3). It was found that male participants had significantly demonstrated comparatively more 'good' knowledge level (32.7%) than females (16.8%), (p=0.015). Participants who had 1-4 children significantly showed more 'good' knowledge level (24.7%) than those who had more than 4 (p=0.049). Also, good knowledge levels significantly higher among participants who chose to have information from books/posters (35.4%) than 32.9% of those who liked health education campaigns and 17.5% of those who liked the internet and social media (p=0.001). Age, marital status, educational level, employment status, and need for more information did not show a significant association with knowledge level (p>0.05).

The number of participants with poor knowledge is 302, while those who have good knowledge are 82 equals 384 total number of all participants. The perceptions and practices related to SBS among the participants are given in (Table 4). The majority of the participants (96.4%) caregivers reported that they wanted to know more about SBS. The most preferred source to get information regarding SBS was physician/health care staff (82.3%), followed by books and posters (41.1%), health education campaigns (38%), and internet / social media (32.8%). About the chose period for information about SBS, about 110 (28.6%) chose it before pregnancy, 104 (27.1%) during pregnancy, 118 (30.7%) 1 week after birth, and 52 (13.5%) selected for during child vaccination visits. When asked about the most common practice they do when a baby cries, reported that 71.9% of participants said that they 'carry the child', followed by 'pat the baby on the back (51.6%)', 'calm baby by shaking' (45.6%) and 'ask for help from a family member or friend' (32.3%).

Table 1 Data of participated Children's primary caregivers, Hail City, Saudi Arabia

Personal data	No	%
Age in years		
18 - 20	54	14.1%
21 - 29	162	42.2%
30 - 39	98	25.5%
40+	70	18.2%
Gender		
Male	110	28.6%
Female	274	71.4%
Marital status		
Married	322	83.9%
Divorced / widow	62	16.1%
Educational level		
Secondary / below	130	33.9%
Diplome / university	222	57.8%
Post-graduate degree	32	8.3%

Employment status		
Unemployed	298	77.6%
Student	64	16.7%
Employed	22	5.7%
Number of children		
1-4	292	76.0%
5-7	72	18.8%
> 7	20	5.2%

Table 2 Knowledge and awareness of Children primary cares giver regarding Shaken Baby Syndrome (SBS) in Hail city

Knowledge and awareness items	No	%
What do you think about shaking the baby?		
Harmful	124	32.3%
May be harmful	218	56.8%
Not harmful	8	2.1%
I don't know	34	8.9%
Consequences of shaken baby syndrome?		
Brain hemorrhage	190	49.5%
Blindness	104	27.1%
Learning difficulties	222	57.8%
Behavioral changes	132	34.4%
Coma	152	39.6%
None	16	4.2%
Do you think that shaking a baby can lead to death?		
Yes	164	42.7%
May be	150	39.1%
No	70	18.2%
Do you think we can prevent shaken baby syndrome?		
Yes	276	71.9%
No	18	4.7%
I don't know	90	23.4%

Table 3 Factors associated with primary caregivers' knowledge about shaken baby syndrome

Factors	Knowledge & awareness level				p-value
	Poor		Good		
	No	%	No	%	
Age in years					
18-20	48	88.9%	6	11.1%	0.306
21-29	126	77.8%	36	22.2%	
30-39	70	71.4%	28	28.6%	
40+	58	82.9%	12	17.1%	
Gender					
Male	74	67.3%	36	32.7%	0.015*
Female	228	83.2%	46	16.8%	
Marital status					
Single	16	80.0%	4	20.0%	0.693$
Married	256	79.5%	66	20.5%	

Divorced / widow	30	71.4%	12	28.6%	
Educational level					0.258
Secondary / below	104	80.0%	26	20.0%	
Diploma / university	178	80.2%	44	19.8%	
Post-graduate degree	20	62.5%	12	37.5%	
Employment status					0.374
Unemployed	228	76.5%	70	23.5%	
Student'	56	87.5%	8	12.5%	
Employed	18	81.8%	4	18.2%	
Number of children					0.049*
1-4	220	75.3%	72	24.7%	
5-7	62	86.1%	10	13.9%	
> 7	20	100.0%	0	0.0%	
Do you want to know more about shaken baby syndrome?					0.642$
Yes	290	78.4%	80	21.6%	
No	12	85.7%	2	14.3%	
Preferred source to gain information					0.001*
Physician / health care staff	240	75.9%	76	24.1%	
Internet / social media	104	82.5%	22	17.5%	
Health education campaigns	98	67.1%	48	32.9%	
Books / posters	102	64.6%	56	35.4%	

*P: Pearson X2 test $: Exact probability test * P < 0.05 (significant)*

Table 4 Primary Caregivers' practices regarding Children shaken baby syndrome

Practice items	No	%
Do you want to know more about shaken baby syndrome?		
Yes	370	96.4%
No	14	3.6%
Preferred source to gain information		
Physician/health care staff	316	82.3%
Books / posters	158	41.1%
Health education campaigns	146	38.0%
Internet / social media	126	32.8%
Preferred period for information about shaken baby syndrome?		
Before pregnancy	110	28.6%
During pregnancy	104	27.1%
1st week after birth	118	30.7%
During vaccination visits	52	13.5%
What do you do when your baby is crying?		
Carry	276	71.9%
Pat baby on the back	198	51.6%
Calm baby down by shaking	174	45.3%
Ask for help from a family member or friend	124	32.3%
Do nothing	20	5.2%

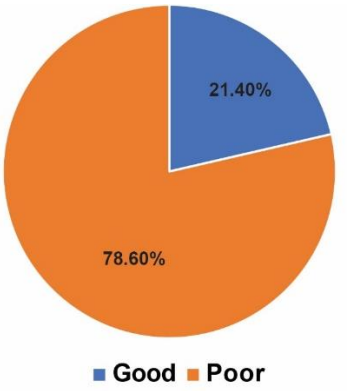

Figure 1 Overall knowledge level among primary caregivers regarding Shaken Baby Syndrome (SBS).

4. DISCUSSION

The main objective of this study was to explore the knowledge and awareness regarding SBS among Saudi parents residing in the Hail region of Saudi Arabia. Result of this study showed that more than three-fourths (78.6%) of the participants had poor knowledge related to SBS. Findings reported by Mann et al., (2015) who found almost half of the parents had never heard of SBS. Furthermore, almost half of the participants (45.3%) in our study said that they shake babies to calm them down when crying, which is a wrong and risky practice that could cause SBS. Studies have shown that parents can be more capable of managing infant/parental distress if they are made aware of the risks associated with shaking a baby as well as the challenges, they will face during the adjustment process (AlOmran et al., 2022; Barr, 2012). Despite this proof, however, it has been challenging to determine whether the SBS rate decreases with increased education levels. Therefore, there is currently no evidence that is up to date regarding the prevalence of SBS in Saudi Arabia.

The current study found that only 23.9% of the participants said they had previously heard about SBS, but 42.7% said they knew that shaking a baby could lead to death. This contrasted with previous result said more heightened parents' knowledge about SBS. Studies done in Ireland, Turkey, France, and the United States said more heighted awareness and knowledge related to SBS than our study result (Harding et al., 2004; Foley et al., 2013; Simonnet et al., 2014; Dias et al., 2021). Although the exact number of parents who shook their infant in a manner that could cause neurological damage remains unknown. About 45% of the parents in this research admitted shaking their babies, which is significantly higher than the rates recorded in earlier studies. A study done in the Netherlands by Reijneveld et al., (2004) reported that only less than 3.5% of the parents had shaken their infants at least once. Study done in the USA by Zolotor et al., (2008) said that 2% of mothers shook their infants when they cried.

Research in Japan showed that 3.9% of mothers had shaken their 4-month-old infants at least once in the previous month (Fujiwara et al., 2016). It is necessary to mention that having heard of SBS is also not the same as understanding what SBS is or that the individuals are familiar with necessary coping mechanisms and preventative measures. Parents who said heard of SBS and agreeing that shaking an infant can lead to mortality also said shaking their baby when they cry is suggestive of this (Agran et al., 2003; Barlow and Minns, 2000). Infants in first six months, most of non-accidental injuries occur, crying has a provocative consequence on abuse (Agran et al., 2003). The significant increase in trembling that occurs between the ages of three and six months is consistent with the fact that battering is the leading cause of hospitalization and mortality in this age group. Evidence shows that the unemployed and families with non-biological parents are at the more significant risk of taking measures that jeopardize the health of child maltreatment (UNICEF, 2003).

Studies of fatal abuse of infants that appeared to be triggered by their cries lend credence to the idea that our research may provide the missing link between these two sets of data (Reijneveld et al., 2001). More research into the causes of deadly child maltreatment is required. Acquiring an exact record or even an approximation of annual incidences of SBS in Saudi Arabia has been challenging since there is a lack of constructive debate about SBS in the medical community and the general public. And a verified diagnosis of SBS is difficult to attain because of the depth and complexity of the clinical diagnosis. However, more studies needed to determine the true incidence of SBS in Saudi Arabia. One of the positive aspects of our study was an acceptable sample size that represented the Saudi parents who are primary caregivers residing in the Hail region. Some limitations discussed before interpreting our results.

Since this survey depended on parental self-report, our results may be affected by underreporting. The anonymity of the data collected may help mitigate this limitation. Caregivers whose children have a history of shaking might be less likely to participate in

the survey, which could underestimation of the shaking rate. The result also depends on caregivers' perceptions of their behavior rather than more objective measurements, so that some practices may be under-reported. Selection bias could skew our findings if the parents who agreed to engage in the research were more interested in the topic than those who declined. The current study, some items related to parental knowledge of infant crying and shaking had "yes" as the correct response, and we did not account for the possibility that parents were aware of this fact as they answered the questions, which could have affected their responses. Further studies are needed to assess who this response affects reporting bias among respondents.

5. CONCLUSION

In conclusion, the study revealed that children caregivers in Hail had poor knowledge and awareness regarding Shaken baby syndrome and its hazardous consequences. Female caregivers demonstrated poor knowledge than males, which consider as significant as the primary caregivers of children are females (mothers). Parents of newborns, especially mothers, should educated about Shaken baby syndrome and its consequences. Our country's healthcare professionals need to learn how to recognize SBS symptoms and make a diagnosis. It is essential to implement community-based public health programs such as Nurse home visitation programs to reduce the prevalence of child maltreatment, avoid it in specific high-risk populations, and reduce the likelihood of recidivism in families with a history of child abuse. There is a need for accurate statistics on the disease's prevalence, and finally, we need to demonstrate that the frequency of Shaken baby syndrome cases has dropped due to of these efforts.

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Author Contributions

All authors contributed in conceptualization of the article.

Somaia Ibrahim: The corresponding author contributed in questionnaire construction, discussion writing and supervised all the processes of the study and critically reviewed and approved the final draft.

Hadeel Alzahrani: Participated in introduction writing and identified the relevant articles for inclusion. Main contributor in introduction writing.

Gharam Alsalmi: Participated in data collection and management, main contributor in result section.

Reghd Alkhalifah: Participated in data collection, main contributor in material and method section

Sarah Albarrak: Contributed in data collection and analysis and in writing the results.

Lubna Aloufi: Participated in data collection and in the writing of introduction

Faisal Alqarqah: Participated in data analysis and management and in the writing of discussion.

Nawaf Alwahbi: Participated in data collection and in introduction and discussion writing.

Shagan Elsdeeg: Contributed in questionnaire construction and organization, main contributor in discussion writing.

Ethical approval

The study was approved by the Medical Ethics Committee of University of Hail, Saudi Arabia (Ethical approval code: H-2022-417).

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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