Original Article

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Knowledge of mothers about neonatal danger signs attending Children's Welfare Teaching Hospital in Medical City Directorate, Baghdad, Iraq

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ABSTRACT

Background: The first 28 days of life, known as the neonatal period, represent a critical time when infants are at the highest risk of mortality. Most neonatal deaths occur in low-income countries with inadequate healthcare systems. The World Health Organization has identified specific neonatal danger signs (NDSs) that indicate potential illness. **Aim**: This study aimed to assess Iraqi mothers' understanding of neonatal risk signs in 2024 and identify factors influencing this knowledge. **Method**: This descriptive cross-sectional hospital-based study involved 400 mothers attending the Children's Welfare Teaching Hospital in Baghdad from November 2023 to March 2024. Mothers who could identify at least three of the 10 NDSs were considered to have good knowledge. **Results**: The study found that 223 (56%) mothers had high knowledge. The most recognized NDSs were jaundice (65%), fast breathing (60%), and elevated body temperature (51.75%). The least recognized signs included Lowered temperature (0.75%), redness, foul smell, umbilical discharge, skin rash, and eye drainage (4% each). Good knowledge was significantly associated with increased prenatal care visits. Mothers who received guidance from non-health facility consultants were more knowledgeable. About 15% mothers reported seeing no warning signs in their children. **Conclusion**: The study conducted at the Children's Welfare Teaching Hospital in Baghdad revealed that mothers possessed a fair understanding of NDSs, with jaundice being the most commonly recognized. Mothers who received advice from non-health facility advisers, primarily family and social media, showed significantly higher knowledge levels. Recommendations include enhancing educational programs in antenatal and postnatal care, utilizing mass media, and conducting community-based studies to improve maternal understanding of NDSs.

Keywords: Knowledge, mothers, neonatal, danger, signs, Children's Welfare Hospital

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INTRODUCTION

The neonatal period encompasses the first 28 days of a newborn's life, during which the risk of death is the highest [1]. Neonatal fatalities occur in developing countries with limited access to healthcare.[1] In 2020, 47% of all deaths among children under five occurred within the neonatal period, which is an increase from

40% in 1990. This rise is attributed to the global decline in mortality rates for children under five, which is occurring at a faster pace compared to the rate of mortality in newborns.[2] Neonates often exhibit subtle signs of illness, and families must be able to recognize these indicators and seek medical attention promptly, especially many infants are born at home or discharged from hospitals .[3] Approximately four million neonates die within the neonatal period annually, with nearly all (99%) of these deaths occurring in low- and middle-income countries. Although south-central Asian nations report the largest numbers, sub-Saharan Africa often has the highest rates.[4] More than 50% of child deaths in these regions, particularly in sub-Saharan Africa, can be attributed to preventable health issues that can be addressed with affordable and straightforward interventions.[5]

Prompt and effective home treatment, along with timely medical intervention to identify warning signs in newborns, is crucial for reducing neonatal mortality. Integrating neonatal and childhood illness management aims to empower mothers, community leaders, and healthcare workers to recognize danger signs in newborns, facilitating appropriate care. The high neonatal death rate is partly due to the potential for a baby to die within minutes if timely identification, diagnosis, and treatment are not provided. Strong maternal awareness of neonatal danger signs (NDSs) is crucial for achieving acceptable newborn and infant mortality levels. NDSs serve as the first step for comprehensive neonatal healthcare. It is vital to raise community awareness about NDSs and improve maternal practices to promote newborn survival.[6]

In Iraq, neonatal deaths account for more than half of under-five mortality, highlighting the urgent need for health interventions to improve essential neonatal care and effective treatment for neonatal conditions.[7] The trend of reduced hospital stays after childbirth and early discharges has led to bilirubin levels reaching their peak at home rather than in the hospital. Consequently, mothers become primarily responsible for detecting and seeking medical attention for this condition. Therefore, it is crucial for parents to accurately understand how to identify neonatal jaundice and respond appropriately.[8]

Moreover, Iraq has faced wars, economic challenges, and internal displacements since the 1980s, resulting in one of the highest neonatal mortality rates in the eastern Mediterranean region.[9] The neonatal death rate was 42.9 per 1,000 live births in 2020, with prematurity and respiratory distress syndrome being the main causes[10] This study aims to assess the knowledge of NDSs among mothers at the Children's Welfare Teaching Hospital, Medical City, Baghdad, Iraq, in 2024, and to identify factors influencing mothers' knowledge of these signs.

MATERIALS AND METHODS

This hospital-based descriptive cross-sectional study was conducted at the inpatient and outpatient wards of the Children's Welfare Teaching Hospital, Medical City, Baghdad, Iraq, from November 2023 to March 2024 the place of study. The study involved mothers with children under one year who attended the hospital and agreed to participate. Exclusion criteria included mothers who were mentally or physically incapable to responce. The minimum sample size for the survey was estimated at 384 by using the formula ($n = z^2pq/d^2$).

- n: Required sample size.
- z: Z-score for confidence level (e.g., 1.96 for 95% confidence).
- p: Estimated proportion of the population with the characteristic (e.g., 0.5 if unknown).
- q: 1−p1 - p1−p, or the proportion without the characteristic.
- d: Desired margin of error (e.g., 0.05 for ± 5%).

This formula helps determine the number of participants needed to accurately estimate a proportion in a population, and 400 mothers participated. Data were collected through face-to-face interviews using a pre-tested, semi-structured questionnaire.[8] The questionnaire covered sociodemographic and obstetric variables and mothers' knowledge of NDSs. A mother was considered knowledgeable if she could mention at least three of the 10 World Health Organization-recognized danger signs, such as poor feeding, convulsions, fever, hypothermia, severe chest indrawing, fast breathing, jaundice, local infection, and central cyanosis.[1,2] mothers sociodemographic variables included age (categorized into three groups: < 20 years, 20–30 years, and > 30 years), education (categorized into four groups: illiterate/read and write, primary school, secondary school, and college and above), occupation (categorized into employed housewife), and residence (categorized into urban and rural). Obstetric variables included parity (< 3, 3–4, and > 5), antenatal care visits (yes/no), number of visits (< 5, 5–9, and > 10), education during visits (yes/no), education after delivery (yes/no), and type of advisor (health workers, doctors, nobody, family members, TV/media, and friends).

Statistical analysis was performed using Microsoft Excel version 22 for data entry and SPSS (Statistical Package for the Social Sciences) version 29 for analysis. Categorical variables were presented as frequencies and percentages. The chi-square test was used to assess associations between categorical variables, with a p-value of < 0.05 considered statistically significant.

Ethical approvals were obtained from the Ethical Scientific Committee at the Department of Family and Community Medicine, College of Medicine, University of Baghdad, and the College Council of the College of Medicine, University of Baghdad Family and Community Medicine. Additionally, verbal consent was obtained from each participant after explaining the study's aim and assuring confidentiality.

RESULTS

The total number of participants in this cross-sectional study was 400. Among them, 267 (61.8%) were aged 20–30 years, and 119 (29.8%) were over 30 years. Regarding education, 144 (36%) had primary education, and 111 (27.8%) had secondary education. A significant majority of 339 (84.8%) samples lived in urban areas. In terms of parity, 184 (46%) had fewer than three, while 145 (36.2%) had between three and four children. Antenatal care visits were reported by 395 (98.8%) mothers, with 65.2% of participants having 5–9 antenatal care visits; however, only a small percentage received any education related to neonatal care during (1.3%) or after (2%) these visits. Most participants (96.7%) did not receive advice from health workers or doctors. Instead, 34.5% relied on non-health personnel, primarily family members (67.9%), for advice. This highlights a strong reliance on informal networks for health guidance and a lack of educational support from formal healthcare services, as illustrated in Table 1.

As shown in Table 2, the most common NDSs identified by the mothers were jaundice (65%), followed by fast breathing (60%) and elevated body temperature (51.75%). The least recognized signs were Lowered temperature of the body (0.75%), followed by redness, foul smell, umbilical discharge, skin rash, and eye drainage (4% each).

Table 1: Distribution of the studied sample according to the studied variables.

The studied variables		No	%
Age	< 20 years	34	8.4
	20–30 years	247	61.8
	> 30 years	119	29.8
Education	Illiterate/read and write	79	19.8
	Primary	144	36.0
	Secondary	111	27.8
	College and above	66	16.4
Occupation	Employed	40	10.0
	Housewife	360	90.0
Residence	Urban	339	84.8
	Rural	61	15.2
Parity	< 3	184	46.0
	3–4	145	36.2
	> 5	71	17.8
Antenatal care visits	Yes	395	98.8
	No	5	1.2
Number of antenatal care visits	< 5	81	20.3
	5–9	261	65.2
	> 10	58	14.5
Education during antenatal care visits	Yes	5	1.3
	No	395	98.7
Education after delivery	Yes	8	2.0
	No	392	98.0
Advisor	Health workers	8	2.0
	Doctors	5	1.3
	Nobody	387	96.7
Advisory by other than health facility personnel	Yes	134	34.5
	No	253	63.5
Advisors other than health facility personnel	Family member	91	67.9
	TV	2	1.5
	Media	37	27.6
	Friends	2	1.5
	Others	2	1.5

Table 2: Identification of NDSs by the mothers.

NDSs	No.	%
Hotness of the body	207	51.75
Coldness of the body	3	0.75
Redness, foul smell, umbilical discharge, skin rash, eye drainage	16	4.00
Unable to breastfeed	78	19.50
Excessive crying	47	11.75
Convulsion	82	20.50
Nonresponse to sensory stimulus	58	14.50
Jaundice	260	65.00
Lower chest indrawing (fast breathing)	240	60.00
Central cyanosis	58	14.50

Figure 1 shows that 223 (56%) of the studied mothers had good knowledge.

Figure 2 shows that 61 (15%) participants did not identify any dangerous signs in their children.

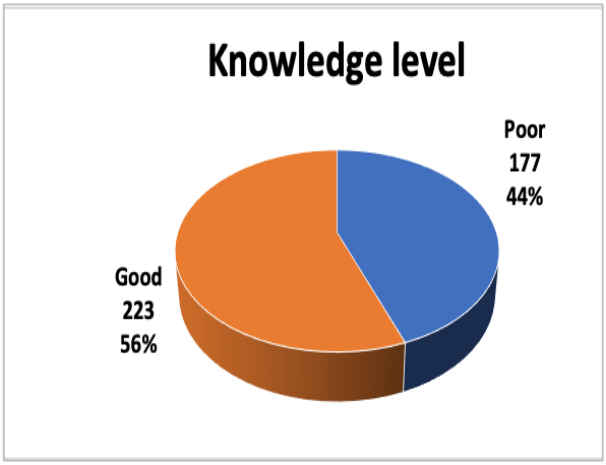

Figure 1: Distribution of studied cases according to knowledge level.

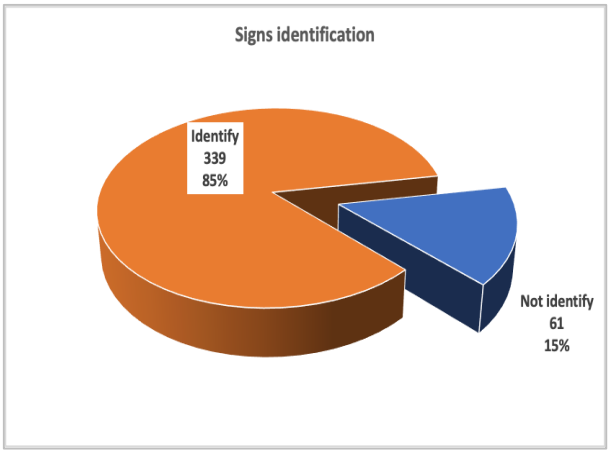

Figure 2: NDSs identified by the mothers.

Table 3 indicates that there was no significant association between age group, educational level, occupation, residence, parity, number of antenatal visits, education during visits, education after delivery, health staff advisors, and knowledge level, with p-values > 0.05 in all cases. Good knowledge was significantly associated with antenatal care visits (p-value = 0.012). Mothers who received advice from non-heath facility sources exhibited significantly higher rate of good knowledge (p-value = 0.001). There was no significant association between knowledge level and neonatal outcomes, as shown in Table 4.

Table 5 shows that jaundice is the most recognized sign, while coldness of the body is the least recognized sign, along with excessive crying of babies mentioned by the participants.

Table 6 shows that there was no significant association between the suggested occurrence of neonatal danger signs NDSs and the consequent actions of mothers (p-value = 0.229).

Table 7 shows that there were no significant associations between the occurrence of any sign and the level of knowledge, with p-values > 0.05 in all cases, except for cyanosis, which showed a significant association with good knowledge (p-value = 0.026).

Table 3: Distribution of the study sample by knowledge level and sociodemographic and obstetric history.

Studied variables		Total	Knowledge level				p-value
			Poor		Good		
			N	%	N	%	
Age	< 20 years	34	18	52.90	16	47.10	0.401
	20–30 years	247	111	44.90	136	55.10	
	> 30 years	119	48	40.30	71	59.70	
Education	Illiterate and read and write	79	38	48.10	41	51.90	0.529
	Primary	144	65	45.10	79	54.90	
	Secondary	111	50	45.00	61	55.00	
	College and above	66	24	36.40	42	63.60	
Occupation	Employed	40	16	40.00	24	60.00	0.568
	Housewife	360	161	44.70	199	55.30	
Residence	Urban	339	147	43.40	192	56.60	0.4
	Rural	61	30	49.20	31	50.80	
Parity	< 3	184	86	46.70	98	53.30	0.62
	3–5	145	60	41.40	85	58.60	
	> 5	71	31	43.70	40	56.30	
Antenatal care visits	Yes	395	172	43.50	223	56.50	0.012
	No	5	5	100.00	0	0.00	
Number of antenatal care visits	< 5	81	40	49.40	41	50.60	0.498
	5–9	261	114	43.70	147	56.30	
	> 10	58	23	39.70	35	60.30	
Education during antenatal care visits	Yes	5	1	20.00	4	80.00	0.388*
	No	395	176	44.60	219	55.40	
Education after delivery	Yes	8	4	50.00	4	50.00	0.737*
	No	392	173	44.10	219	55.90	
Advisor	Health worker	8	3	37.50	5	62.50	0.382*
	Doctors	5	2	40.00	3	60.00	
	Nobody	387	172	44.40	215	55.60	
Adviser other than health facility	Yes	134	37	27.60	97	72.40	0.001
	No	253	133	53	120	47	

* The chi-square test and Fisher's exact test were used.

Table 4: Association between the improvement of neonate and knowledge level.

Improvement of neonate		Knowledge level				p-value
		Poor		Good		
		N	N %	N	N %	
Yes	297 88.9%	126	42.4%	171	57.6%	0.471
No	37 11.1%	18	48.6%	19	51.4%	

Table 5: Frequency of occurrence of NDSs.

NDSs	N	%
Hotness of the body	41	10.3
Coldness of the body	3	0.8
Redness, foul smell, umbilical discharge, skin rash, eye drainage	6	1.5
Unable to breastfeed	16	4.0
Excessive crying	3	0.8
Convulsion	18	4.5
Non-response to sensory stimulus	12	3.0
Jaundice	229	57.3
Lower chest indrawing (fast breathing)	94	23.5
Central cyanosis	26	6.5

Table 6: Association between suggested action by mothers for NDSs (if they occur) and knowledge level.

The actions of mothers	Total	Knowledge level				p-value
		Poor		Good		
		N	%	N	%	
Take to a health facility	55	26	47.3	29	52.7	0.229
Self-care	1	1	100.0	0	0.0	
Traditional healers	5	4	80.0	1	20.0	

Table 7: Association between the occurrence of NDSs and knowledge level.

Occurrence of NDSs		Total	Knowledge level				p-value
			Poor		Good		
			N	%	N	%	
Hotness of the body	occur	41	17	41.50	24	58.50	0.705
	not occur	359	160	44.60	199	55.40	
Coldness of the body	occur	3	0	0.00	3	100.00	0.258*
	not occur	397	177	44.50	220	55.50	
Redness, foul smell, umbilical discharge, skin rash, eye drainage	occur	6	1	16.70	5	83.30	0.234*
	not occur	394	176	44.70	218	55.30	
Unable to breastfeed	occur	16	6	37.50	10	62.50	0.579
	not occur	384	171	44.50	213	55.50	
Excessive crying	occur	3	0	0.00	3	100.00	0.258*
	not occur	397	177	44.60	220	55.40	
Convulsion	occur	18	6	33.30	12	66.70	0.34
	not occur	382	171	44.80	211	55.20	
Nonresponse to sensory stimulus	occur	12	5	41.70	7	58.30	0.655
	not occur	388	172	44.30	216	55.70	
Jaundice	occur	229	103	45.00	126	55.00	0.734
	not occur	171	74	43.30	97	56.70	
Lower chest indrawing (fast breathing)	occur	94	41	43.60	53	56.40	0.888
	not occur	306	136	44.40	170	55.60	
Central cyanosis	occur	26	6	23.10	20	76.90	0.026*
	not occur	374	171	45.70	203	54.30	

*Fisher's exact test was used.

DISCUSSION

The study highlighted that more than half of the mothers could identify three or more NDSs, thus demonstrating a fair level of knowledge. These findings surpass those from Ethiopia (37.2%),[10] Saudi Arabia (37%),[11] Ghana (28.3%),[12] and Kenya (15.5%).[13] In Iraq, a study by Abdulrida et al. reported that 81% of mothers could identify three or more signs.[14] Variations in knowledge

may be due to differences in study populations, settings, and sociodemographic factors, such as education and antenatal care attendance.[14] Jaundice, fast breathing, and elevated body temperature were the most commonly recognized danger signs, aligning with findings from Ghana.[15] However, studies in sub-Saharan Africa identified fever, breastfeeding difficulties, and fast breathing as the most common signs.[10,16] The awareness of fever may be linked to the prevalence of malaria in those regions. Lesser-known signs included hypothermia, umbilical discharge, and skin rash.[5,11,12] The differences in disease spectra between various countries and regions, along with the differing emphasis on health education provided to mothers may help explain these variations in findings.

The study also noted that 15% of mothers could not identify any danger signs; while this is a concerning figure, it is lower than those in Kenya (18%)[11] and Nigeria (22%).[16] The higher figures in these countries are possibly due to their lower educational levels. Jaundice was the most frequently recognized illness (57.3%) prompting medical care, similar to findings in Kenya and Nigeria.[14,16] This may be due to jaundice's visibly recognizable nature. The study found no significant association between age group, educational level, occupation, residence, parity, antenatal visits, education during visits, education after delivery, health staff advisors, and knowledge level. These findings align with those of Zaman et al. in Bangladesh,[17] although other study have shown that higher education correlates with better knowledge.[18] In this study, antenatal care visits were significantly associated with good knowledge, and mothers advised by non-health facility sources showed better knowledge, both consistent with findings from Mohammed et al. in Ethiopia.[19] In contrast, other studies reported that mothers receiving advice from health facility staff had greater knowledge of NDSs.[12,14]

The present study also found that family members were the primary source of non-medical education, followed by social media (27.6%), similar to results from Kuganab-Lem et al. in Ghana.[20] This study found no significant association between the ability to identify NDSs and overall knowledge level, contrasting with findings from Hibstu et al. in Ethiopia,[21] where better knowledge correlated with improved NDS identification. This difference may stem from varying study settings and populations. No significant association was found between the suggested occurrence of NDSs and mothers' actions (e.g., taking the neonate to a health facility, self-care, or traditional healers), similar to findings by Kibaru et al. in Kenya.[10] Other studies, however, suggested that mothers with better knowledge made wiser decisions regarding their neonates' care.[15,16,22]

Regarding neonatal outcomes, this study found no significant association between knowledge level and the outcome of the neonates, consistent with Durrani et al.'s study in Pakistan.[23] However, several other studies indicated that mothers with higher knowledge were quicker to seek medical help, leading to better outcomes.[13,19,24,25] Cross-tabulation showed no significant association between danger signs and knowledge level, except for cyanosis, which was significantly linked to good knowledge. This finding aligns with a study by Nepal et al.[26]

This study's limitations were the possibility of recall bias. Caregivers recruited in this study had infants aged six weeks to 2.5 years. These long recollection periods may have resulted in recall bias about the genuine knowledge of mothers and time taken to seek medical attention for sick neonates. Sandberg et al. noted that participants who had given birth within 30 days of the study had stronger recollections than mothers with older infants.[5]

CONCLUSIONS

The knowledge of three or more NDSs was good among mothers at the Children's Welfare Teaching Hospital, Medical City, Baghdad, Iraq. The commonly identified signs were jaundice, fast breathing, and fever, with hypothermia being the least recognized. Mothers who had antenatal care visits and received advice from non-health facility advisors had significantly better knowledge; family members and social media were the primary sources of information. Most mothers reported that their neonates had never experienced illness. There was no significant association between mothers' identification of NDSs, consequent actions taken by them, and neonatal outcomes with their knowledge level. Further studies recommended for more details information.

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