Effect of Awareness Program on Newly Mothers' Knowledge and Practices Regarding Neonatal Jaundice

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Abstract

Background: Newborns are at a much-increased risk of neonatal jaundice due to the relative adverse effects of neonatal hyperbilirubinemia**. Aim:** This study aimed to evaluate the effect of awareness program on newly mothers' knowledge and practices regarding neonatal jaundice**. Research design:** A quasi-experimental research design (pre-and post-test) was used to achieve the aim of this study. **Setting:** The study was carried out in the pediatric outpatient clinics at Mansoura University Hospital**. Sample**: A convenient sample of 100 newly mothers was included in the previously mentioned setting their ages between 18 and 35 and accepted to participate in the study sample**. Tools:** Tool (I): **Newly Mothers' Personal Data** such as age, level of education, occupation, and residence, Tool (II): Newly Mothers' Knowledge Assessment Sheet regarding to Neonatal Jaundice, and **Tool (III):** Newly Mothers' Practices Assessment Sheet regarding to neonatal jaundice**. Results:** The study findings revealed that mothers had a higher score of knowledge and reported practice post-implementation of the awareness program compared to pre-implementation regarding neonatal jaundice. There was a positive correlation between mothers' total knowledge and practice scores at the p= 0.001 level of significance regarding neonatal jaundice post-implementation. **Conclusion:** Implementing of awareness program has a positive effect on newly mothers' knowledge and practices regarding neonatal jaundice**. Recommendations:** An awareness program is recommended for newly mothers to improve their knowledge and practices regarding neonatal jaundice

Keywords: Awareness program, Neonatal jaundice, Newly mothers' knowledge and practices

Introduction

Neonatal jaundice is characterized by a yellowish staining of the skin and mucous membranes in infants. It is one of the most frequent reasons for hospital admission and needs to be treated. In the first 28 days of life, jaundice affects 60% of term and 80% of preterm newborns. Data about the prevalence of newborn jaundice in specific nations are inconsistent. Usually, it changes depending on the race and location (**Wu et al., 2021)**.

Neonatal jaundice, sometimes called neonatal hyperbilirubinemia, is the term used to describe yellow staining of the skin or other organs brought on by the body's buildup of bilirubin (**Khan et al., 2019**). According to **Kliegman (2020**), jaundice is a prevalent clinical issue in the newborn era, affecting 50–60% of full-term infants and 80% of preterm infants within the first week of life. Neonatal jaundice is a benign illness in a large number of newborns. Acute bilirubin encephalopathy (ABE) or kernicterus, on the other hand, can result from severe hyperbilirubinemia and develop into nerve deafness, cerebral palsy, choreoathetosis, intellectual incapacity, and even death (**Blackburn, 2022**).

Furthermore, according to a global survey, at least 480 700 neonates experience severe hyperbilirubinemia per year, with a 13% (n=75 400) risk of kernicterus and a 24% (n=114 100) chance of death (**Hockenberry, 2021**). Newborns' lives and health are thus seriously threatened by neonatal jaundice and society and families are severely burdened by the high rates of impairment and mortality that are linked to it.

One of the most important ways to stop ABE and kernicterus is to treat newborn jaundice as soon as possible. The majority of healthy full-term infants are discharged from the hospital by the fifth or seventh day following birth, which is also when neonatal jaundice often peaks. Thus, home is where most newborn jaundice happens. Mothers are frequently the first to notice bruises, their progression, early indications of ABE, and karmic terminology for babies because they are the primary caretakers of the infants after they are released from the hospital. To effectively control newborn jaundice, they are essential to getting the desired results. Reducing the incidence of ABE was linked, according to **Wennberg et**

al. (2017), to giving women comprehensive information on newborn jaundice and its hazards.

Aggarwal et al. (2020) suggested that maternal education on neonatal jaundice should be the focus of the Stop Kernicterus initiative, which showed that a delay in seeking care, regardless of birth site, was a key cause of ABE and kernicterus. Parents and other caregivers should also be educated about neonatal jaundice, particularly how to check their baby for jaundice and what to do when it is suspected, according to the clinical practice guidelines for neonatal jaundice from the American Academy of Pediatrics Subcommittee and the National Institute for Health and Care Excellence (**Olusanya et al., 2019**). Among the many subjects, these guidelines recommend that maternal jaundice teaching be given primary emphasis. Nonetheless, genuine interaction between hospital staff and moms is the foundation of good training (**Olusanya et al., 2020**) Hospital staff therefore need to clarify what mothers know about jaundice and their current attitudes and practices, which will allowhealth education programs to target identified gaps.

The fact that fewer occurrences of severe jaundice occur in high-income nations is also notable, as preventative and treatment efforts have improved. In low- and middle-income nations, however, the situation is different. This can be due to several things, including blood group incompatibilities, G6PD deficiency, sepsis, absence of routine blood testing for mothers and newborns, absence of a uniform screening methodology that includes a jaundice screening tool, lack of public awareness, and parental education. Unconjugated bilirubin can build up excessively in the brain and serum bilirubin levels can rise if detection is delayed. In the long run, this can result in long-term sequelae and kernicterus. Hearing loss, developmental disabilities, and infantile cerebral palsy are among the conditions that are more common in newborns with severe neonatal jaundice (**Wu et al., 2021)**.

Globally, Neonatal Jaundice occurs in 60% of full-term babies and 80% of preterm babies usually within the first of life (**Shehu, et al., 2020**). Each year, globally, about 1.1 million babies worldwide develop severe hyperbilirubinemia. An increased number of these cases of neonatal jaundice occurred in Sub-Saharan Africa and South Asia (**Farouk et al., 2021**). Neonatal jaundice involves the yellowish discolorations of the sclera and skin in a newborn, which result from increased bilirubin in the blood. Bilirubin is produced from heme, and in neonates, there is increased production of bilirubin than in adults because of polycythemia and increased red blood cell turnover (**Soltaninejad & Dehdashti, 2020**).

It is impossible to ignore the persistent reports of bilirubin encephalopathy and severe hyperbilirubinemia in Egypt. Pre-discharge screening, except in private practices, is not commonly carried out for risk factors for severe hyperbilirubinemia or neonatal jaundice. The hospital-based data that are now available do not accurately reflect the whole population (**Xing, 2021**).

Newborns are at a much-increased risk of neonatal jaundice due to the relative adverse effects of neonatal hyperbilirubinemia. neonatal jaundice is a major contributing cause of newborn hospitalizations and, therefore among the leading causes of newborn deaths. Signs of neonatal jaundice progress in the cephalocaudal direction, resulting from the increased blood level of bilirubin (**Al-Zamili & Saadoon, 2020**). The increase in bilirubin levels leading to newborns' neonatal jaundice is due to the excess hemoglobin breakdown. High hemoglobin levels at birth the reduced lifespan of newborn red blood cells (70–80 days) and hepatic metabolism of bilirubin results in immature hepatocytes (**Boadi-Kusi et al., 2021**). Aside from these, other maternal and neonatal risk factors such as preeclampsia, Glucose-6-phosphate dehydrogenase (G6PD) deficiency, ABO blood group incompatibility, prematurity, birth weight, intrauterine growth retardation, metabolic abnormalities, neonatal sex, birth weight, and nutrition were equally identified as risk factors for neonatal jaundice (**Abdul-Mumin et al., 2021; Shehu, et al., 2020).**

Neonatal jaundice complications include cerebral palsy, bilirubin encephalopathy, and in the worst state death of the newborn (**Demis et al., 2021**). Interventions toward preventing neonatal jaundice were referred to include phototherapy and appropriate exchange of blood transfusion, which were identified as key interventions to the prevention of kernicterus and reduced sickness and deaths among newborns (**Ullah et al., 2020**). Early prevention of neonatal jaundice is important in the first week of life (**Al-Zamili & Saadoon, 2020**). **Denis et al (2021)** assert that mothers' knowledge and understanding of the risk factors of neonatal jaundice help reduce the morbidity and mortality of neonatal jaundice among newborns. **Abdul-Mumin et al (2021**) reported that inadequate information or lack of knowledge about neonatal jaundice might contribute to delayed decision-

making and obtaining medical services for the treatment of neonatal jaundice.

Regularly monitoring patients for signs of jaundice is one of the nurses' many responsibilities during routine physical assessments. Seeing the infant's entire skin tone, along with the color of their mucous membranes and sclera, is the most reliable way to determine whether or not they are jaundiced. The yellow stain becomes more noticeable and blanchs when direct pressure is applied to the skin, particularly over bony prominences like the sternum or tip of the nose (**Peng et al., 2021).**

Significance of the study

Knowledge and awareness of neonatal jaundice, screening, and treatment process would help mothers seek an early start of phototherapy and treatment of neonatal jaundice. It will also help to avoid problems associated with neonatal jaundice and the progression of the conditions to a severe state. There is limited literature on mothers' knowledge and awareness of neonatal jaundice. The few literatures identified reported low knowledge of mothers regarding the causes of neonatal jaundice, however, awareness level was reported high among mothers. Conducting a study to measure mothers' knowledge and understanding of neonatal jaundice would help to identify the gaps and target areas for intervention which would help to prevent chronic morbidity and mortality of neonates (**Salia et al., 2021**).

In Egypt, kernicterus and severe hyperbilirubinemia are predisposed by several other variables. According to **Iskander et al. (2019**), these include inadequate mother knowledge about the potential risks of severe neonatal jaundice, delaying seeking medical advice, using neon lamps at home for jaundice treatment that do not provide the necessary wavelength, and having trouble accessing quality medical care, particularly when needed in remote areas. As the primary caregiver, it is recommended that the mother have a thorough grasp of how to identify neonatal jaundice and know how to react correctly. Early detection and fast treatment reduce the risk of developing a possibly irreversible problem. As a result, moms need to be well-informed about how to treat a jaundiced infant, recognize warning signals early, and deal with any complications. It helps in effective treatment and also in the prevention of jaundice complications (**Allahony et al., 2019**)

Numerous studies have shown that mothers' knowledge of their infants' jaundice is insufficient. Mothers' awareness of the origins, management, and complications of newborn jaundice was found to be lacking (**Peng et al., 2021).** So, this study aimed to evaluate the effect of awareness programs on new mothers' knowledge and practices regarding neonatal jaundice.

Aim of the study

This study aimed to evaluate the effect of awareness program on newly mothers' knowledge and practices regarding neonatal jaundice.

Research hypothesis

H1: Newly mothers' knowledge mean score will be improved after the implementation of an awareness program regarding neonatal jaundice.

H2: Newly mothers' practices mean scores will be improved after the implementation of an awareness program regarding neonatal jaundice.

Subjects and Method

Research design

A quasi-experimental research design was used to conduct this study. This type of design is an empirical study used to examine the effect of an intervention on its target population without random assignment. It will be used as not all of the three elements of a true experiment were attained, and to reduce the difficulty and ethical concerns that may surround the pre-selection and random assignment of test subjects (Polit & Beck, 2014).

Setting

The study was carried out at the pediatric outpatient clinics (general clinics 4 and 5) that work five days a week from 9 am to 1 pm at Mansoura University Hospital**.**

Subjects

A convenient sample of 100 newly mothers was selected from the previously mentioned setting, their ages between 18 and 35, and accepted to participate in the study sample.

Data Collection tools

The researchers used three tools to gather thenecessary data:

Tool (I): Newly Mothers 'Personal Data such as age, level of education, occupation, and residence.

Tool (II): Newly Mothers' Knowledge Assessment Sheet regarding Neonatal Jaundice

The researchers based on related literature to evaluate the gain of knowledge after the implementation of the awareness program regarding neonatal jaundice. It included 20 questions for assessing mothers' knowledge about neonatal Jaundice, such as definition, causes, Early signs and symptoms, Time of appearance of neonatal jaundice, Time of physician consultation about neonatal jaundice, First sites of neonatal jaundice appear in it, Types of neonatal jaundice, complications of neonatal

jaundice and management of neonatal jaundice (Abdul-Mumin et al., 2021; Iliyasu et al., 2020; Shehu, Shehu & Ubanyi, 2020).

Scoring system

The knowledge assessment questionnaire items contained 20 items and the score of each item was (0) for don't know/ wrong answer and (1) for correct answer. These items were as follows: assessment of mothers' knowledge regarding Neonatal Jaundice, knowledge about Neonatal Jaundice was evaluated giving a score of 0-20. The total score of each mother was categorized into ―Poor knowledge when the mother achieved less than 60% of the total score, fair when the score from 60% -85%, and -good knowledge was considered when the mother achieved more than > 85% of the total score (**Hegazy & Abusaad**, 2019).

Tool (III): Newly Mothers Practices Assessment Sheet regarding Neonatal Jaundice

The researchers based on related literature to evaluate and improve reported practices after the implementation of the awareness program regarding neonatal jaundice. It included 4 questions for assessing mothers' reported practices about Neonatal Jaundice, such as I took the initiative to seek information about neonatal jaundice, After discharge, I checked my infant for jaundice, such as the color of the skin, sclerae, urine, bowel movements., after discharge, i followed the doctor's instructions to take the infant to a medical institution or community healthcare center to measure the bilirubin level, after discharge, i breastfed adequately (**Hussein H, Aziz, 2018, Shrestha et al., 2019, Kasemy et al., 2020; Preer GL, Philipp, 2021, Wennberg et al., 2022**). The practice score for each participant was determined by allotting a score of (1) to correct responses and (0) to incorrect responses. This gave a maximum obtainable practice score of 4.

The total scores were categorized as satisfactory practice in case of ≥ 60% of total scores obtained and unsatisfactory; in case of < 60% of total scores obtained (**Alfar, 2020)**.

Field Work

Data was collected through the following phases

I-Preparatory phase

- Before beginning the study, the Mansoura University Faculty of Nursing's Ethics Committee gave its approval.
- Official permission for data collection was obtained from the responsible authorities of the study setting after an explanation of the study objective.
- The researchers created a tool (I), whereas tools (II), & (III), were adopted.

A group of five academics with extensive experience in the field of pediatric nursing examined the tools for content validity, and no revisions were made.

Tools validity and reliability

The tool was tested for content validity by a jury of three experts in the field of pediatric nursing staff and two experts in community health nursing professors who reviewed the instruments for clarity, relevance, comprehensiveness, understanding, applicability, and easiness, in establishing the reliability and statistically done Alpha Cronbach way to check the stability of the internal consistency of the instrument 1I was 0.897 and instrument 1II was 0.922.

Ethical Considerations

The researchers met with the nursing and medical directors of the chosen settings before the study's commencement to obtain their consent and to explain the study's objectives. To get new mothers' cooperation, written consent was requested. This letter, written to request authorization for data collection, outlined the purpose of the study and the results that would be anticipated from its implementation. It was conveyed to expectant mothers what the study's goal was. Noting that participation in the trial was entirely optional, the researchers gave the new moms the option to decline. The research allowed new moms to leave at any moment, for any reason, and without explanation. The confidentiality of personal information was guaranteed to new mothers and used for research purposes only.

Pilot study

A pilot study was conducted on 10% of (10 newly mothers) from the total sample to test the clarity and feasibility of the research process and ensure the clarity and applicability of the study tools over time.

II-Implementation phase

- The study was submitted for the approval of the ethical committee of the research
- Before starting this study, formal administrative approval was taken from the setting.
- The researchers collected data from the mothers who attended previously selected settings three days / a week from the middle of January to the middle of June 2023.
- The researchers met mothers at the waiting area present at previously selected settings and explained the aim of the study after introducing themself to patients. The researchers used face-to-face interviews and they read the questions and possible answers to the mothers to help them fill their

responses in the tools. After selecting the mothers, the aim and importance of the research study were explained.

- The researchers measured knowledge and practice before the intervention, using tools (II and III).
- The simplified booklet was used as a supportive material and given to patients in the Arabic language to cover all items regarding the research topic after reviewing the related literature based on the assessment of the actual needs of the studied patients. Different teaching methods such as lectures discussions, pictures, videos, and posters were used. Sessions were performed in the Arabic language to ensure that all study subjects were understood, which included (six theoretical and practical sessions). The duration of sessions for each theoretical and practical session ranged from 50-60 minutes for two days per week.

The content of the awareness program is presented in the following table

Evaluate the effect of the awareness program on newly mothers' knowledge and practices regarding neonatal jaundice

Session No	Subject content	Teaching methods
1	An introductory session that emphasized establishing a relation between the researchers and the studied mothers participating in the study and explanation of the purpose of the program	Discussion
2	Education about the definition, causes, early signs and symptoms, time of appearance of neonatal jaundice, time of physician consultation about neonatal jaundice	PowerPoint presentatio Discussion
3	Education about the first sites of neonatal jaundice appears in it, Types of neonatal jaundice, complications of neonatal jaundice, management of neonatal jaundice	Teaching videos
4	Education about prevention practices for neonatal jaundice, after discharge, checked my infant for jaundice, such as the color of the skin, sclerae, urine, bowel movements.	PowerPoint presentatio Discussion
5	Education about after-discharge followed the doctor's instructions to take the infant to a medical institution or community healthcare ce to measure the bilirubin level, after discharge, breastfeed adequately	PowerPoint presentatio Discussion
6	Summary of the awareness program and the studied mothers were asked to answer the tools post-awareness program.	Discussion

Evaluating the Awareness Program

Five experts' professors in pediatric nursing evaluated the awareness program. The research experts in the fields ensured clarity and appropriateness by reviewing the awareness program and contents regarding neonatal jaundice.

The general objectives of the awareness program were to improve mothers' knowledge and practice, regarding neonatal jaundice**.**

Specific objectives: At the end of the awareness program the studied mothers were able to:

1. Define neonatal jaundice.
2. Classify causes of neonatal jaundice.
3. Enumerate early signs and symptoms of neonatal jaundice.
4. Identify the time of physician consultation about neonatal jaundice.
5. Discuss prevention practices for neonatal jaundice
6. Identify the first sites of neonatal jaundice that appear in it.
7. Explain types of neonatal jaundice
8. Recognize complications of neonatal jaundice.
9. Demonstrate practices of neonatal jaundice prevention
10. Apply the management of neonatal jaundice**.**

III-Evaluation phase

The researchers reassessed the effect of the awareness program on newly mothers' knowledge and reported practices regarding newborns' neonatal jaundice post two weeks using the same pretest tools.

Statistical analysis

Data entry and statistical analysis were performed using SPSS for Windows, version 20. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables and mean and SDs for quantitative variables. Differences between two means tests (t-test) were used. Statistical significance was considered at P-value <0.05.

Results

Table (1): shows that 43% of the studied mothers ages were 18- 25 years with the mean age of mothers being 28.1 ± 6.3 years. Less than three-quarters of mothers (70%) were housewives and 60% came from rural areas. concerning the education level of the studied mothers, more than one-third of mothers (39%) were illiterate.

Figure (1): illustrates that 60% of the studied mothers heard about neonatal jaundice before**.**

Figure (2): portrays that 80% of the studied mothers reported that their main source of knowledge regarding neonatal jaundice was doctors.

Table (2): depicts that there was an improvement and increase in the knowledge mean scores of all dimensions regarding neonatal jaundice post-awareness program with statistically significant differences regarding all items of neonatal jaundice.

Figure (3) shows that 70% of the studied mothers had poor knowledge levels in the pretest while post- awareness program implementation, no one of them had poor level of knowledge.

Figure (4): shows that there were highly statistically significant differences in the studied mothers reported practice at P (<0.001) pre & post- awareness program implementation.

Table 5: Shows the relationship between practice scores, personal information, and overall knowledge. There was a highly statistically significant difference between the mothers' total knowledge score and their occupation and educational level, indicating a fair correlation. Their age and their cumulative practice score, however, only marginally correlated.

Table (6) illustrates the correlation between the total score of nurses' knowledge and practice pre and post awareness program implementation; there was a significant positive correlation between the score of knowledge and the score of practice with statically significant differences (p =0.000).

Table (1): Personal data of the studied mothers (n=100)

Personal data	No.	%
Mothers'age / years		
18- 25	43	43.0
25- 30	35	35.0
30 – 35	22	22.0
Mean ± SD	28.1 ± 6.3 years	
Residence		
Urban	60	60.0
Rural	40	40.0
Occupation		
Housewife	70	70.0
Employee	20	20.0
Private employee	10	10.0
Education level of mother		
Illiterate	39	39.0
Read and write	12	12.0
Primary school	29	29.0
Diploma	12	12.0
University	8	8.0

Figure (1): The studied mothers' distribution regarding hearing about neonatal jaundice before

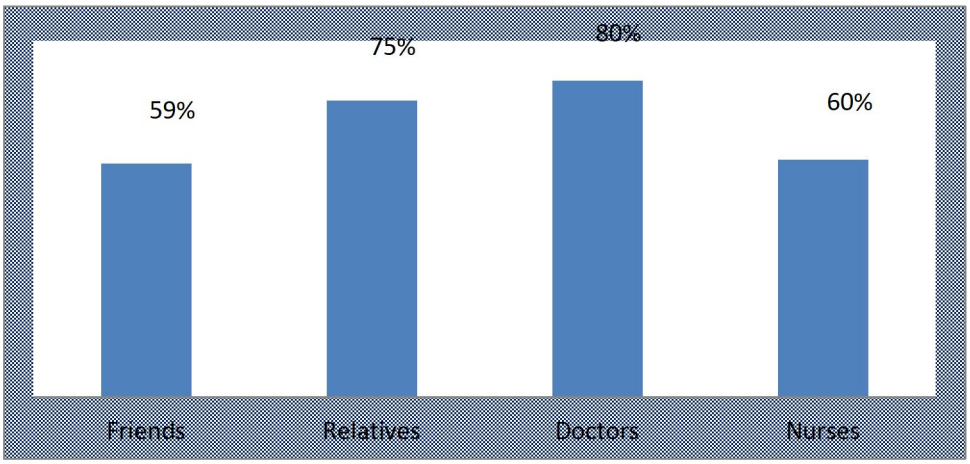

Figure (2): Source of knowledge among the studied mothers regarding neonatal jaundice

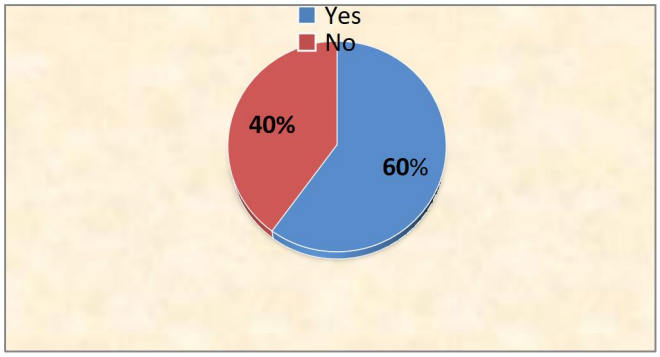

Table (2): Differences between the studied mothers' knowledge mean scores about neonatal jaundice pre & post-awareness program implementation (no=100)

Mothers' Knowledge	Pre-awareness program	Post-awareness program	X2	P-value Pre-post test
	Mean ± SD	Mean ± SD		
Definition of neonatal jaundice	2.88±1.22	5.33±0.55	19.22	0.001**
Causes of neonatal jaundice	1.04±0.66	2.03±0.87	14.33	0.001**
Early signs and Symptoms of neonatal jaundice	3.56±1.77	6.42±0.66	23.44	0.000**
Time of appearance of neonatal jaundice	4.29± 2.48	8.56± 0.87	15.45	0.001**
Time of physician consultation about neonatal jaundice	2.52±9.34	4.88±0.22	43.45	0.000**
First sites of neonatal jaundice appear in it	2.58± 2.28	5.68± 0.33	8.22	0.001**
Types of neonatal jaundice	2.52±9.34	4.66±0.33	43.45	0.000**
Complications of neonatal jaundice	2.31±1.74	5.52± 0.86	62.11	0.000**
Management of neonatal jaundice	2.52±9.34	4.79±0.56	43.45	0.000**

*Statistically significant at ** P <0.01*

Figure (3): Total knowledge level about neonatal jaundice pre & post- awareness program implementation (no=100)

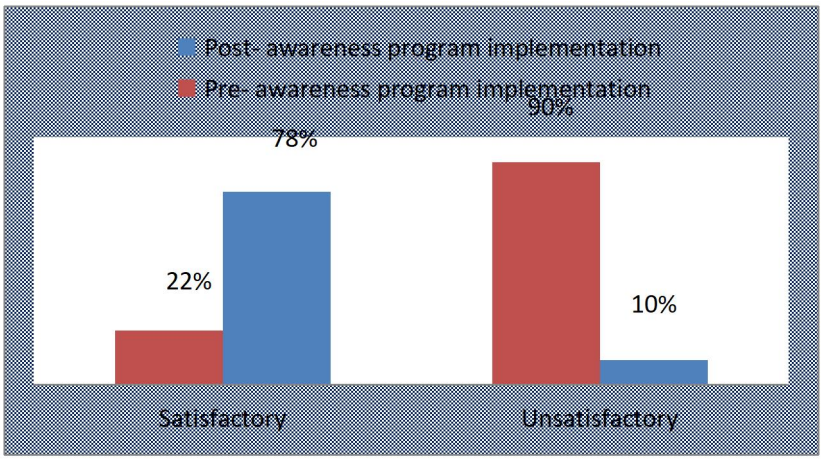

Figure (4): Total reported practice level of the studied mothers regarding neonatal jaundice pre & post- awareness program implementation (no=100)

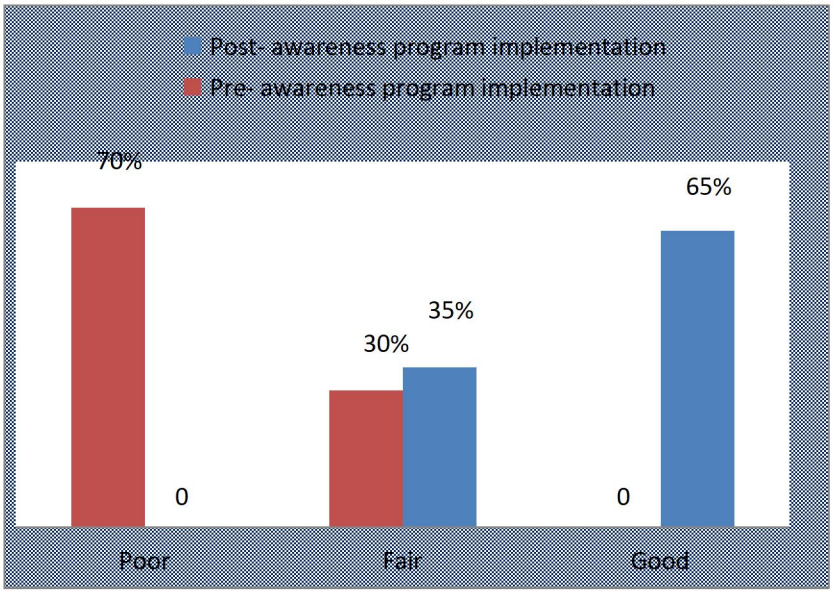

Table (5): Correlation between total knowledge, practice scores and personal data of the mothers

Personal data	Total knowledge scores		Total practice scores	
	r	P – value	R	P – value
Age	.142**	.007	.143**	.010
Residence	-.144**	.007	.075	.189
Occupation	.289**	.0001	.003	.972
The education level of the mother	.281**	.0001	.033	.559
The education level of the father	.208	.06	.097	.071

**Statistical significance at level ≤ 0.01

Table (6): Correlation between total knowledge and practices scores of the studied mothers' pre & post- awareness program implementation

Total practices scores	Total knowledge scores	
	Pre-awareness progr implementation	Post-awareness progr implementation
R	-0.100	0.813
P – value	0.499	0.000**

Discussion

The results of this study showed that fewer than half of the moms who were evaluated were between the ages of 18 and 25. Mothers made up less than three-quarters of the population, and three-fifths of them were from rural areas. Regarding the moms under study, a significant portion of them had no formal education. From the perspective of the researcher, it can be clarified that because the moms in the study were too young, this could account for their lack of understanding and lead to their unsatisfactory behaviors.

The majority of the mothers in this study were between the ages of 21 and 30. This result is in line with those of **Olatunde et al. (2020**), who found that 50.8% of research participants belonged to this age group. Of the people in our survey, just 24% had finished upper secondary education. This conclusion is also in line with a 2018 survey done in Jessore, Bangladesh, where 15.46% of respondents had education beyond the secondary level and 57.27% of respondents had completed secondary school (**Islam et al., 2019**). In a similar vein, a different study conducted at the Dhaka Medical College Hospital found that just 7.3% of participants had finished higher secondary education (**Huq et al., 2017).** Our result is marginally higher than others, suggesting that Bangladeshi women's educational status may be rising with time (**Sosale et al., 2019**).

Based on the study's findings, three-fifths of the mothers who were involved had previously heard of neonatal jaundice. It supported the investigated mothers' need for awareness program implementation, according to the researcher. Contrary to previous research, a sizable portion of survey participants had prior knowledge of newborn jaundice. Family and friends have mostly (and 32%, respectively) told them of this. In the prenatal phase, just 1.9% of women had information from medical professionals. This result contradicts another study that found a significant proportion of women received the information from hospitals. There may be a reason for this that is not addressed in the study—fewer or no prenatal visits (**Adoba et al., 2018**).

Along the same lines, **Shukla and Agarwal (2019**) discovered that 69.5% of women who learned about jaundice did so from community health professionals, accounting for the majority of mothers' knowledge of the condition. In contrast, less than three-quarters of respondents in the current study had never heard of jaundice in newborns, which contradicted the findings of a study by **Goodman et al., (2019**) Friends and relatives provided this information to most people who were aware of the illness.

Results of the current study revealed that the majority of the studied mothers reported that their main source of knowledge regarding neonatal jaundice was doctors. **From the researcher's point of view, it** can explained that the studied mothers have the desire to gain correct information from confident sources as doctors. The commonest source of information from this study is the health worker, while others (friends, family members, and neighbors) ranked second as a source of information. This finding is comparable to previous studies in Nigeria (**Eneh & Ugwu, 2019**) where the health worker was the most commonly identified source of information. The mass media as a source of information ranked low in this study as with other studies (**Ogunfowora et al., 2021**). appropriate interventions rather than amongst mothers with children who have suffered from the condition. These sources cited by mothers were found to share similarities with studies conducted by **Cooray, (2021); Owusu et al., (2018**) in Ghana; and **Shrestha et al., (2019**), which equally cited similar sources that mothers have heard about neonatal jaundice.

The result of the current study revealed that there was an improvement and increase in the knowledge mean scores of all dimensions regarding neonatal jaundice post-awareness program with statistically significant

differences regarding all items of neonatal jaundice. From the researcher's point of view, it confirmed the positive effects of awareness program implementation that meet the studied mothers' needs and help in their knowledge. Three times as many caregivers with prior knowledge of neonatal jaundice as those without any education on the condition were found to have good knowledge of jaundice in a multivariate analysis. The present conclusion (**Huq et al., 2017**) is supported by the research of Huq et al. Similarly, 26.6% of the participants reported not wanting to eat, and 31.3% showed that a high-pitched cry is a red flag for newborn jaundice (**Alfouwais et al., 2018; Iliyasu et al., 2020**).

Similarly, research by **Egube et al. (2019**) showed that 16.2% of moms stated that early childbirth is the cause of jaundice, while 45.5% of participants were unaware of the causes of the condition. Conversely, 81.3% of respondents did not know the causes, 14% knew one cause, and 4.7% knew two potential causes, according to a study by **Onyearugha et al., (2019**). According to the same source (**Allahony et al., 2019**), just 21.5% of moms recognized that the primary complication of severe neonatal jaundice is brain injury, and only 1.5% realized that hearing loss is a common sequel.

Similarly, the study by **Vaez (2021**) discovered that there was a false response about therapy, with 77.5% of the mothers responding that they had given their infants medicines, cures, or herbs, and 2.04% responding that they were unaware of the proper way to treat jaundice. On the other hand, a significant percentage of pregnant mothers—96.1%—agreed that, if their infants suffered neonatal jaundice, they would accept phototherapy as a kind of treatment (**Egube et al., 2019**).

This result aligned with research from Nigeria, which demonstrated that mothers who were informed by medical professionals about neonatal jaundice were much less likely to self-treat and were more likely to seek treatment right away. In line with the "knowledge, attitude, and practices" (KAP) model, which contends that higher knowledge serves as the foundation for positive attitudes and behaviors, we also discovered that mothers who had a high level of knowledge regarding neonatal jaundice were more likely to exhibit positive attitudes and behaviors (**Ezeaka et al., 2019**).

This finding was found to be more advanced compared with the findings of **Shrestha et al., (2019**), which reported awareness of 60%, and Ullah et al, (2020) who equally reported in less awareness level of mothers about neonatal jaundice at 50%. The less awareness of neonatal jaundice among mothers as reported in these studies was attributed to insufficient awareness creation of the neonatal jaundice.

Findings were found to share similarities with the studies of A**bdul-mumin et al., (2021**), and Demis et al., (2021), but these current studies contradicted the findings of **Cooray, (2021**) study which reported less knowledge score of mothers on neonatal jaundice with a score of 31 ±14, which indicate that a little over half of the mothers were found to have had poor knowledge on neonatal jaundice.

Similarly, these signs and symptoms were found to have been reported by studies such as **Ullah et al, (2020**), **and Shankar et al., (2022**) which equally reported the signs and symptoms of neonatal jaundice to include yellow eyes and skin, as well reported 52.5% of mothers to have had inadequate knowledge about neonatal jaundice. In terms of who was the first to have identified the signs and symptoms of neonatal jaundice in the baby an average number of mothers were able to identify the signs and symptoms of neonatal jaundice themselves and a few were prompted either by their husbands or mothers-in-law of the signs and symptoms of neonatal jaundice for a decision to be taken for them to go to the hospital to seek medical treatment.

But these were found to share dissimilarities with studies of **Li et al., (2020**) in Nigeria, and **Abdul-mumin et al., (2021)** in Ghana, which indicated that most signs and symptoms of neonatal jaundice were identified by health workers after the mothers had reported to the hospital. This still calls for more advocacy to educate and empower women to make major healthcare decisions to help ensure the immediate administration of healthcare interventions to save lives. However, these stated interventions were found to relate to studies of, **Benova et al., (2019),** and **Said et al., (2018**), which equally mentioned some of these interventions as treatment and management options for neonatal jaundice.

The result of the current study cleared that less than three-quarters of the studied mothers had poor knowledge levels in the pretest while post-awareness program implementation, no one of them had poor level of knowledge. According to the researcher, this demonstrated how crucial it is to start an awareness program so that moms can become more knowledgeable.

Furthermore, after the awareness campaign is implemented, mothers' understanding of all aspects of newborn jaundice shows highly statistically significant changes, according to the current study's findings regarding mothers' knowledge of the condition. The researcher speculates that this might be because the application gave the moms current, comprehensible information concerning neonatal jaundice.

This significant discrepancy could be explained by the nearly week-long interval that passed between when they received health education and when we conducted our experiment; some moms may have forgotten what they had learned. Moreover, during health education sessions, medical staff neglected to cover newborn jaundice knowledge relevant to the questionnaire and instead focused solely on post-discharge monitoring and follow-up instructions.

The lack of a unique setting where mothers received health education about jaundice from health workers in a single setting that combined a lecture, demonstration, and interactive discussion could also have contributed to the comparative ineffectiveness of postnatal instruction, as there is typically a rush to discharge mothers from birthing centers. This finding of respondent's knowledge of looking eyes for jaundice is comparable with the 70.8% reported by Olatunde et al. in Dhaka City and 77.4% by **Egube et al., (2019**) in Benin City.

Previous research has been done on mothers' perceptions of neonatal jaundice in several studies; however, the findings remain unchanged (**Ghana, Ministry of Health. 2023, Owusu et al., 2019, Goodman et al., 2020**). Lack of awareness of the causes and warning signs of jaundice can lead to women resorting to home remedies, delaying the need for medical attention for newborn jaundice and increasing the risk of kernicterus (**Salia et al., 2021).**

The findings of the current study cleared that there were statistically significant differences in the studied mothers' reported practice pre & post-awareness program implementation. From the researcher's point of view, it confirmed the success of the awareness program implementation that improved the studied mothers' knowledge followed by the improvement of their practice. This finding supported **Fan et al., (2020**) "theory of KAP," which said that having the proper knowledge and practicing it leads to a shift in health behavior. Furthermore, a recent study by **Rana et al., (2020**) found that enough individual knowledge is linked to effective disease prevention, control, and promotion. Knowledge deficit is linked to poor health and maladaptive disease prevention behavior, according to a study by **Ricardo et al., (2018**).

Mothers' reduced energy during the postpartum time may be the reason for this bad behavior. Mothers undergo physical and psychological changes. Nevertheless, health literacy may also be responsible for it, as it influences individuals' actions when searching out health-related information (**Sørensen et al. (2021**). Parental health literacy was found to be correlated with their likelihood of taking the initiative to find out about their child's health, according to a prior study (**Kubb & Foran, 2020**). The management of newborn jaundice after hospital discharge will be facilitated by mothers having a better understanding of pertinent information and being more aware of the condition. Furthermore, as cell phones and the internet become more commonplace, more parents are turning to them for access to parenting information. They do, however, lament the significant difficulties they have determining the accuracy of the material (**Smith et al., 2020**). As a result, it is advised that medical professionals give moms access to a few trustworthy websites in addition to teaching regarding neonatal jaundice to encourage proactive information-seeking.

The present study's results demonstrated a highly statistically significant difference between mothers' total knowledge score and their occupation and educational attainment. Their age did, however, show a slight correlation with their total practice score. The phenomenon of working women leaving their children unsupervised for extended periods while at work may explain this. In terms of education, it may be argued that women with higher education levels were more knowledgeable than mothers without any formal education.

This could be the consequence of poor health-seeking follow-up on the side of the caregivers, or it could be the result of inadequate information provided regarding jaundice, which could be a recipe for the poor knowledge observed. Even with a high degree of education, low health literacy may be the cause of inadequate knowledge. During prenatal care visits, healthcare providers should work together, to use the Ministry of Health's suggested guidelines to educate caregivers about newborn jaundice. This outcome was in line with an Egyptian study (**Moawad et al., 2019**) that showed mothers with university degrees had the best knowledge scores. It is recommended that medical personnel educate moms with lower levels of knowledge about jaundice. Furthermore, it

aligned with the findings of a previous review conducted by **Shrestha et al. (2019**) due to variations in the items or algorithms used to score the attitudes and practices. Comparing the attitudes and behaviors found in our study with those from other nations proved to be challenging (**Hussein & Aziz, 2018**).

This conclusion might be the result of mothers being more aware of the illness from the moment they first come into contact with it, making subsequent encounters with it easier to handle. These findings were consistent with those of (**Egube et al., 2019**), which showed that respondents' knowledge of newborn jaundice was significantly influenced by their educational attainment as well as the number of their prior infants who had the disease.

The findings of the current study illustrated that there was a significant positive correlation between the score of knowledge and the score of practice with statistically significant differences. This finding shows the necessity for mothers of children to raise their awareness and understand the importance of good neonatal jaundice practices to protect their children. Insufficient information results in subpar practices, and conversely, increased knowledge results in appropriate practices, according to the researchers' perspective. This outcome shows how effective it was to run the awareness program, which satisfied the moms' requirements and gave them enough information to manage this illness and indicated the accomplishment of the study's objective as well.

Conclusion

It was concluded from the current study results that impleme

Recommendations

Based on the findings of the current study the following recommendations are suggested:

- An awareness program is recommended for new mothers to improve their knowledge and practices regarding neonatal jaundice
- Raising awareness of new mothers' neonatal jaundice by providing them with an illustrated booklet containing information regarding neonatal jaundice.
- Mothers should be taught by pediatric nurses about the warning signs of neonatal jaundice, preventative measures, and the value of obtaining medical attention for illnesses as soon as possible.
- Health education programs and public awareness campaigns concerning neonatal jaundice and the management of the condition in infants by mothers.
- To generalize the findings, the current study must be replicated with a wider sample of new mothers in various settings.

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