THE INTERACTION OF HEALTH EDUCATION ON KNOWLEDGE OF SIGNS, CAUSES, COMPLICATIONS OF NEONATAL JAUNDICE AND ITS MANAGEMENT AMONG PREGNANT WOMEN

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ABSTRACT: *Background: Previous studies in Nigeria reveal a significant knowledge gap about neonatal jaundice (NNJ) among pregnant women, despite improvements in antenatal care (Adeleye et al., 2020; Adediran et al., 2021). Targeted health education is crucial for enhancing awareness and improving early detection and management of NNJ. Therefore, the objective of this research is to evaluate the effectiveness of the interaction of health education in enhancing the knowledge of pregnant women in Kwara State, Nigeria, regarding the signs, causes, complications, and management of neonatal jaundice. Methodology: This study utilized a quasi-experimental design to investigate the causal relationship between health education and knowledge of neonatal jaundice (NNJ) management among pregnant women in Ilorin, Kwara State. The population included pregnant women in their third trimester attending antenatal clinics, with specific inclusion and exclusion criteria. A total sample of 128 participants was divided into intervention and control groups. Data were collected using a structured questionnaire, ensuring reliability through test-retest methods. Analysis employed SPSS, using descriptive and inferential statistics, with significance set at p<0.05, providing valuable insights into maternal health practices. Results: The analysis indicated no statistically significant difference in baseline knowledge mean scores between the two groups ($t_{(126)} = 0.864$, $p = 0.39$). However, following the intervention, the experimental group demonstrated significantly higher knowledge scores compared to the control group ($t_{(126)} = 9.05$; $p = 0.0001$). Correlation analysis revealed a significant relationship between mothers' management of neonatal jaundice (NNJ) and knowledge of its causes ($r = -0.393$; $p = 0.001$), but no significant correlations with knowledge of signs ($r = -0.131$; $p = 0.302$) or complications ($r = -0.190$; $p = 0.133$) of NNJ post-intervention. At the pre-intervention phase, the standardized coefficient (R) for knowledge on neonatal jaundice (NNJ) management was 0.077 ($p = 0.545$), indicating a weak relationship. The R-square value of 0.006 (0.6%) suggested minimal impact on management. Post-intervention, R increased to 0.290 ($p = 0.02$), with an R-square of 0.084 (8.4%), showing that increased knowledge significantly improved NNJ management. Conclusion: In conclusion, the study shows that educational interventions significantly increased neonatal jaundice knowledge among the intervention group. Maternal knowledge positively influences NNJ management, highlighting the need for ongoing health education and public awareness campaigns to improve neonatal health outcomes in Kwara State, Nigeria.*

KEYWORDS: Neonatal jaundice, management of jaundice, pregnant women and Primary Healthcare

INTRODUCTION

Previous studies on neonatal jaundice (NNJ) in Nigeria have consistently highlighted a significant gap in knowledge regarding its causes, management, and complications among pregnant women (Adeleye et al., 2020). Despite improvements in antenatal care coverage and institutional delivery rates in low-resource settings, these factors alone do not guarantee adequate understanding and practices related to NNJ among mothers (Adediran et al., 2021; Olaogun et al., 2019). This lack of knowledge underscores the critical need for targeted health education initiatives aimed at enhancing maternal awareness of neonatal health issues.

Health education is essential for empowering pregnant women with knowledge about neonatal jaundice, which is characterized by a yellowish discoloration of the skin and eyes due to elevated bilirubin levels in the blood. Globally, NNJ affects approximately 60% of full-term neonates and 80% of preterm infants, contributing significantly to neonatal morbidity (Adeyemo et al., 2021). It can arise from both physiological and pathological processes, and untreated jaundice can lead to serious complications such as kernicterus and developmental delays (Olaogun et al., 2019). Incorporating health education into antenatal care not only enhances knowledge but also promotes positive health behaviours, ultimately leading to better health outcomes for infants (Adeleye et al., 2020).

In Kwara State, targeted health education initiatives have shown promise in improving maternal understanding of NNJ (Adeleye et al., 2020). For example, increased awareness of jaundice symptoms enables early detection, which is crucial for timely intervention. A study involving 518 pregnant women in southwestern Nigeria found that a substantial number (69.5%) displayed poor knowledge of NNJ, although most reported obtaining their information from healthcare facilities (Adediran et al., 2021). Comparative studies, including one conducted in Ethiopia, revealed similar findings, where a majority (57%) of mothers recognized the yellowish colour of the eyes and skin as indicators of NNJ (Adediran et al., 2021). These discrepancies in knowledge levels among different populations can often be attributed to variations in educational background; mothers with higher educational attainment tend to have a better understanding of NNJ, possibly due to academic exposure or self-education. In contrast, a study in Canada indicated that over half (62%) of respondents were aware of phototherapy as a treatment option for affected infants, emphasizing the need for improved education in different contexts (Adeyemo et al., 2021).

Despite the evidence supporting the role of health education, research examining the factors leading to NNJ remains limited. Various maternal and child health outcomes, such as reduced rates of prematurity and low birth weight, have been linked to comprehensive health education programs (Olaogun et al., 2019). Consequently, it is essential for healthcare teams to implement educational activities that prepare pregnant women for childbirth and the postpartum period. However, it is critical to acknowledge the diversity among pregnant women, as they represent multiple demographic groups with varying needs and contexts. Educational strategies must be tailored to achieve the desired outcomes for different target populations (Adediran et al., 2021).

NNJ is a leading reason for referrals to tertiary healthcare facilities in Nigeria (Adeleye et al., 2020). Unfortunately, many affected infants are brought in late, often with acute bilirubin encephalopathy (ABE), which is a severe complication of untreated NNJ. Delays in seeking care are often due to a lack of understanding of NNJ among mothers and caregivers, as well as the mismanagement of this common neonatal issue within the community (Adeyemo et al.,

2021). Failure to identify and manage NNJ in a timely manner can lead to severe neurological sequelae, including bilirubin encephalopathy.

This study aims to evaluate the effectiveness of the interaction of health educational sessions on the knowledge of pregnant women regarding the signs, causes, complications, and management of NNJ in a selected senatorial district in Ilorin, Kwara State. By enhancing maternal knowledge through structured health education, we hope to improve early detection and treatment of neonatal jaundice, ultimately reducing its incidence and complications in the region. This initiative represents a crucial step toward safeguarding the health of neonates and ensuring better health outcomes for infants in Kwara State.

LITERATURE/THEORETICAL UNDERPINNING

Neonatal jaundice, a condition marked by elevated bilirubin levels, can cause severe complications in newborns if not detected and managed promptly (Ogunfowokan & Daniel, 2021). In Nigeria, neonatal jaundice remains a major cause of infant mortality, partly due to inadequate knowledge among mothers regarding its signs, causes, complications, and management (Adebanjo et al., 2020). Health education plays a pivotal role in addressing this gap, especially among pregnant women, who are primary caregivers after childbirth. Studies have highlighted the importance of educating pregnant women about neonatal jaundice, as increased awareness improves timely detection and management, reducing neonatal morbidity and mortality (Agbo et al., 2019). However, research on the effectiveness of health education interventions in Nigeria, particularly in Kwara State, remains limited. According to Adeoye et al. (2022), while healthcare systems in the region attempt to provide basic prenatal education, the depth and comprehensiveness of information related to neonatal jaundice are often insufficient. Pregnant women, especially in rural areas, receive little information on the early signs of jaundice, such as yellowing of the skin and eyes, which can lead to delayed hospital visits and worsened outcomes (Fajolu & Ezeaka, 2019).

The theoretical underpinning of this study is grounded in the Health Belief Model (HBM), which posits that an individual's health-related behavior depends on their perceived susceptibility to and severity of a health condition, as well as the benefits of taking preventive action (Glanz et al., 2008). In the context of this research, the HBM helps explain how pregnant women's perception of neonatal jaundice influences their knowledge acquisition and subsequent actions. Studies suggest that when women perceive the risk of neonatal jaundice as severe and are aware of its complications, they are more likely to engage in preventive practices such as early screening and breastfeeding (Onasoga et al., 2018). In conclusion, enhancing the knowledge of pregnant women through health education is critical in addressing neonatal jaundice in Kwara State. However, the success of such interventions depends on how well they are tailored to the local context and the perceived health beliefs of the women involved.

METHODOLOGY

This study employed a quasi-experimental research design, akin to true experiments, to explore the causal relationship between independent and dependent variables. This design allowed for the identification of these relationships without the necessity of random assignment, making it both cost-effective and resource-efficient. Practical and ethical considerations precluded randomization, making the quasi-experimental design an appropriate choice. The study included two experimental groups and one control group to assess the impact of health education on the knowledge and self-efficacy regarding neonatal jaundice (NNJ) management among pregnant women in Ilorin, Kwara State.

The target population consisted of pregnant women attending antenatal clinics across all senatorial districts in the study area. Inclusion criteria were established to ensure relevant participant selection: women of reproductive age (15-49 years), those in their third trimester, those attending antenatal care (ANC) in the selected facilities, and those who provided informed consent to participate. Exclusion criteria included women under 15 years, those not in their third trimester, first-time visitors to the health facilities, women who would not deliver at the facility, and those who did not consent to participate in the study.

The sample size was determined based on prevalence rates, with an additional 10% attrition rate factored in. This resulted in a minimum sample size of 64 participants per group (58 + 5.8), culminating in a total of 128 pregnant women. Given their frequent clinic visits, this population was deemed accessible. The participants were divided into two groups: the intervention group (64) and the control group (64).

A multi-stage sampling procedure was employed for participant selection. The first stage involved selecting senatorial districts, followed by a second stage where local governments within the selected districts (Central and South) were chosen via ballot. The third stage involved randomly assigning the selected Local Government Areas into intervention and control groups, considering the Primary Health Centers (PHCs). Finally, in the fourth stage, 16 eligible pregnant women who met the inclusion criteria were randomly selected from the ANC register at each PHC, ensuring an equitable distribution of participants. Data were collected using a structured questionnaire designed to capture socio-demographic characteristics and assess knowledge regarding the signs, symptoms, causes, and complications associated with late identification of neonatal jaundice among pregnant women. To ensure the reliability of the instrument, a test-retest reliability method was employed, administering the same questionnaire to the same group of individuals on two separate occasions. The reliability coefficients were determined through the Intraclass Correlation Coefficient, yielding scores of 0.81 for knowledge, 0.794 for perception, and 0.824 for health-seeking behavior, indicating robust internal consistency with a significance level of $p<0.05$.

Data analysis was conducted using the IBM Statistical Package for the Social Sciences (SPSS) version 23. The data were subjected to both descriptive statistics (frequency, percentages, means, standard deviations, standard errors) and inferential statistics (t-tests, correlation, and linear regression). A statistical significance threshold was set at 0.05, with p-values less than 0.05 considered significant. In summary, the quasi-experimental design, structured sampling procedures, and rigorous data collection methods utilized in this study provide a solid foundation for investigating the impact of health education on pregnant women's knowledge and management of neonatal jaundice. By effectively addressing the inclusion and exclusion

criteria, the study ensures that the findings are relevant and applicable to the target population. The use of validated instruments and robust statistical analyses further enhances the credibility of the research outcomes, contributing valuable insights into maternal health practices in Nigeria.

Ethical Considerations

An application was submitted to the Babcock University Health Research and Ethics Committee (BUHREC) and Ministry of Health Kwara State to obtain ethical approval for the study protocol, ensuring compliance with the university's Institutional Review Board (IRB) requirements for ethical research conduct.

RESULTS/FINDINGS

Table 1: The socio-demographic characteristics of the experimental and control group at the baseline

Variable	Category	Control group (n=64)		Experimental group (n= 64)		χ^2	P	Total N (%)
		N	%	N	%			
Age	18-22	4	6.3	5	7.8	1.41	.843	9(7.0)
	23-27	18	28.1	16	25.0			34(26.6)
	28-32	22	34.4	27	42.2			49(38.3)
	33-37	14	21.9	10	15.6			24(18.8
	38-40	6	9.4	6	9.4			12(9.4)
Level of education	Primary	2	3.1	-	-	2.59	.273	2(1.6)
	Secondary	24	37.5	29	45.3			53(41.4)
	Tertiary	38	59.4	35	54.7			73 (57.0)

Age (Mean ±SD): CG= 30.34±5.09; EG= 29.59±4.92 (overall mean $_{(128)}$ = 29.97±5.002, range from 18 to 40 years; majority are 30 years old)

The analysis revealed that the majority of participants in the study were around 30 years old, with ages ranging from a minimum of 18 to a maximum of 40 years. The overall mean age of participants was 29.97 years (±5.002). While the control group exhibited a higher mean age, the difference between the groups was not statistically significant (χ^2 = 1.41; p > 0.05). A notable 57% of participants had attained tertiary education, and analysis indicated no significant differences across educational levels between the groups (χ^2 = 1.41; p > 0.05). This suggests that both groups share similar characteristics, indicating no inherent advantages in terms of age or education (Table 1).

Knowledge of Neonatal Jaundice (NNJ)

Table 2: The level of knowledge of pregnant women on signs, causes, and complications of NNJ at pre-intervention phase in Kwara state, Nigeria.

S/N	Knowledge items	Control group X±SD	Experimental group X±SD	p-value
	Signs:			
11	Yellowish discoloration of the skin and eyes is a sign of neonatal jaundice	.44±.500	.44±.500	1.00
12	Down turning of the eye is a danger sign of jaundice in a baby	.27±.445	.33±.473	.443
13	A Baby Feeding very poorly is a symptom of neonatal jaundice	.47±.503	.38±.488	.287
14	Jaundice will make a baby irritable and is difficult to console	.45±.502	.38±.488	.374
	Mean score for Signs of NNJ	**1.63±1.24**	**1.52±1.10**	**.598**
	Causes:			
15	Difference between blood groups is a cause jaundice	.38±.49	.34±.48	.715
16	Prematurity of a baby is a cause of jaundice	.41±.50	.42±.50	.859
17	jaundice is a curse from the gods	.50±.50	.44±.50	.483
18	Use of Camphor on clothes can cause Jaundice	.27±.45	.25±.44	.841
	Mean score for causes of NNJ	**1.55±1.02**	**1.45±.87**	**.578**
	Complications:			
19	Jaundice can render a child physically handicapped	.33±.47	.25±.44	.333
20	A baby that has jaundice can die	.45±.50	.36±.48	.284
21	Jaundice can lead to deafness in a child if not treated	.47±.50	.50±.50	.726
	Mean score for complications of NNJ	**1.25±1.07**	**1.11±1.13**	**.471**
	Overall Total of level of knowledge	4.42±2.38	4.08±2.11	0.39

Maximum points on scale of measure = 11 (low=0-3; moderate=4-6; High=7-11)

At the baseline, the overall knowledge level among participants was measured on a maximum point scale of 11, indicating a slightly moderate understanding. The control group had an average knowledge score of 4.42 (±2.38). An independent sample t-test revealed no statistically significant difference in knowledge scores between the control and experimental groups (t(126) = 0.864, p = 0.39 > 0.05). This trend was consistent across knowledge regarding signs (p = 0.598), causes (p = 0.578), and complications (p = 0.471) associated with NNJ (Table 2).

Table 3. The level of knowledge of pregnant women on signs, causes, and complications of NNJ at post intervention phase in Kwara state, Nigeria.

S/N	Knowledge items	Control group X±SD	Experimental group X±SD	p-value
	Signs:			
11	Yellowish discoloration of the skin and eyes is a sign of neonatal jaundice	.44±.50	.80±.41	.000
12	Down turning of the eye is a danger sign of jaundice in a baby	.27±.45	.77±.43	.000
13	A Baby Feeding very poorly is a symptom of neonatal jaundice	.47±.50	.80±.41	.000
14	Jaundice will make a baby irritable and is difficult to console	.45±.50	.80±.41	.000
	Mean score for Signs of NNJ	**1.62±1.24**	**3.16±.86**	**.000**
	Causes:			
15	Difference between blood groups is a cause jaundice	.38±.49	. 77±.43	.000
16	Prematurity of a baby is a cause of jaundice	.41±.50	.77±.43	.000
17	jaundice is a curse from the gods	.50±.50	.80±.41	.000
18	Use of Camphor on clothes can cause Jaundice	.27±.45	.25±.44	.841
	Mean score for causes of NNJ	**1.55±1.02**	**2.58±.83**	**.000**
	Complications:			
19	Jaundice can render a child physically handicapped	.33±.47	.19±.39	.070
20	A baby that has jaundice can die	.45±.50	.75±.44	.001
21	Jaundice can lead to deafness in a child if not treated	.47±.50	1.25±1.07	.000
	Mean score for complications of NNJ	**1.25±1.07**	**1.75±.84**	**.004**
	Overall Total of level of knowledge	4.42±2.38	7.48±1.29	.000

Maximum points on scale of measure = 11 (low=0-3; moderate=4-6; High=7-11)

Post-intervention results showed a marked increase in knowledge among participants in the experimental group, rising from an average of 4.08 (±2.11) to 7.48 (±1.29). The independent sample t-test confirmed a statistically significant difference when comparing the experimental group to the control group (t(126) = 9.05; p = 0.0001 < 0.05). Notably, participants in the experimental group had nearly double the knowledge score concerning the signs of NNJ (3.16 ± 0.86) compared to the control group (1.62 ± 1.24), which was significant at p = 0.0001. Although the difference in knowledge about complications of NNJ was less pronounced, it still demonstrated a significant difference between the groups (p = 0.004). This indicates that the educational sessions had a more substantial impact on knowledge concerning the signs and

causes of NNJ than on complications. The control group did not show significant differences in understanding complications such as jaundice leading to physical handicaps (p = 0.07 > 0.05) (Table 3).

Management Acceptance and Efforts

Table 4: Participants views or acceptance of management of NNJ for their babies at pre- and post-intervention phase in Kwara state, Nigeria

	Items showing Participant's efforts or acceptance to manage NNJ	Pre intervention phase			post intervention phase		
		CG X±SD	EG X±SD	p-value	CG X±SD	EG X±SD	p-value
1	Delivering in a health facility will facilitate proper management of neonatal jaundice	0.69±0.73	0.72±.83	.821	0.69±0.73	1.19±.81	.000
2	will get my child tested for jaundice after delivery	2.28±.85	2.23±.66	.727	2.28±.85	2.78±.42	.000
3	will not use herbal medication for my baby to prevent jaundice	1.53±.99	1.91±1.04	.038	1.53±.99	2.67±.69	.000
	Mean score for mgt towards NNJ	4.50±1.51	4.86±1.52	.182	4.50±1.52	6.64±**1.**33	.000

Maximum points on scale of measure = 9 (low=0-3; moderate=4-5; High=6>)

Participants' attitudes and acceptance towards the management of NNJ showed considerable improvement post-intervention. The experimental group demonstrated a significant increase in both acceptance and efforts for NNJ management, contrasting sharply with the control group (p < 0.05). The control group maintained a moderate management score of 4.50 (±1.51) without improvement, while the experimental group's score rose significantly to 6.64 (±1.33) following the health education session (Table 4). This suggests that targeted educational interventions can effectively enhance pregnant women's knowledge and management practices related to neonatal jaundice.

Relationship Between Knowledge on Signs, Causes, Complications, and Management of NNJ by Mothers in the Experimental Group (EG)

Table 5. Correlations matrix on the relationship between knowledge on signs, causes, complications and management of NNJ by mothers (EG) in selected Communities.

Pre intervention		Overall Knowledge	signs	causes	complications	Management
Knowledge	Pearson correlation	1				
	Sig. (2-tailed)					
	N	64				
Signs	Pearson correlation	.790**	1			
	Sig. (2-tailed)	.000				
	N	64	64			
Causes	Pearson correlation	.621**	.227	1		
	Sig. (2-tailed)	.000	.072			
	N	64	64	64		
Complications	Pearson correlation	.718**	.383**	.163	1	
	Sig. (2-tailed)	.000	.002	.197		
	N	64	64	64	64	
Management	Pearson correlation	.077	.228	-.087	-.010	1
	Sig. (2-tailed)	.545	.069	.493	.939	
	N	64	64	64	64	64

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

This analysis focuses on the experimental group (EG) due to the lack of significant changes observed in the control group (CG) during the pre- and post-intervention phases. The correlation analysis revealed no significant relationships between the management of neonatal jaundice (NNJ) by mothers and their knowledge of the signs ($r = 0.228$; $p = 0.069$), causes ($r = -0.087$; $p = 0.55$), and complications ($r = -0.01$; $p = 0.94$) of NNJ at the pre-intervention phase. Although there was a weak positive correlation overall ($r = 0.07$; $p = 0.55$), it indicated that knowledge did not significantly influence management practices among the participants at this stage (Table 5).

Table 6. Correlations matrix on the relationship between knowledge on signs, causes, complications and management of NNJ by mothers in selected Communities.

Post intervention		Knowledge signs	causes	complications	Management
Knowledge	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	64			
sign	Pearson Correlation	.549**	1		
	Sig. (2-tailed)	.000			
	N	64	64		
Cause	Pearson Correlation	.447**	-.151	1	
	Sig. (2-tailed)	.000	.235		
	N	64	64	64	
Complications	Pearson Correlation	.529**	-.033	-.154	1
	Sig. (2-tailed)	.000	.795	.224	
	N	64	64	64	64
Management	Pearson Correlation	.290*	-.131	.393**	.190	1
	Sig. (2-tailed)	.020	.302	.001	.133	
	N	64	64	64	64	64

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Following the intervention, a new analysis (Table 6) showed significant relationships between mothers' management of NNJ and their knowledge of the causes (r = -0.393; p = 0.001). However, no significant correlations were found concerning the signs (r = -0.131; p = 0.302) and complications (r = -0.190; p = 0.133) of NNJ. The overall knowledge score also indicated a significant relationship with management practices (r = 0.290; p = 0.020), suggesting a weak but positive correlation. This indicates that an increase in knowledge about the causes and complications of NNJ can lead to better management practices among the participants. Notably, the negative correlation with knowledge of signs (r = -0.131) suggests that knowledge about the signs of NNJ does not effectively drive necessary management actions (Table 6).

Impact of Knowledge on Management of NNJ at Pre-Intervention Phase for EG

Table 7: Regression analysis on the impact of knowledge on management of NNJ among EG participants at pre-intervention

	Coefficients of the Regression Analysis						
	Model summary of test statistics						
	N	**R**	**R-square**	**Std. Error**	**F**	**T**	**p-value**
impact of knowledge on management of NNJ	64	0.077	0.006	1.5195	0.371	0.609	0.545 b

1. Dependent Variable: Participants reports on management of NNJ

Table 7 highlights that the standardized coefficient (correlation coefficient-R) relating knowledge to management of NNJ is 0.077. This value indicates a very weak positive relationship, meaning that although an increase in knowledge could theoretically lead to improved management practices, the effect is not significant ($p = 0.545$). The R-square value of 0.006 reveals that the level of knowledge accounted for just 0.6% of the variance in NNJ management among the selected women. Consequently, the null hypothesis (H_{o1}), which posits that knowledge of pregnant women regarding neonatal jaundice has no significant impact on their management of NNJ at the pre-intervention phase, is accepted ($R^2 = 0.006$; $p = 0.545$).

Impact of Knowledge on Management of NNJ at Post-Intervention Phase for EG

Table 8: Regression analysis on the impact of knowledge on management of NNJ among EG participants at post-intervention

	Coefficients of the Regression Analysis						
	Model summary of test statistics						
	N	**R**	**R-square**	**Std. Error**	**F**	**T**	**p-value**
impact of knowledge towards management of NNJ	64	0.290	0.084	1.279	5.702	4.620	0.020 b

1. Dependent Variable: Participants report on management of NNJ

Note: Further analysis focused on EG because no significant changes were observed at pre and post intervention for the control group (CG).

In contrast, Table 8 presents a more encouraging picture post-intervention. The standardized coefficient (correlation coefficient-R) relating knowledge to management of NNJ increased to 0.290, suggesting a slightly weak but statistically significant positive relationship ($p = 0.02 < 0.05$). The R-square value of 0.084 indicates that knowledge now accounted for 8.4% of the variance in management practices among the women. Thus, the null hypothesis (H_{o1}), which states that maternal knowledge regarding neonatal jaundice has no significant impact on management practices at the post-intervention phase, is rejected ($R^2 = 0.084$; $p = 0.020$). This direct and significant relationship highlights that increased knowledge among participants about NNJ can significantly enhance their management practices, indicating the effectiveness of the educational intervention.

Overall, these findings underscore the critical role of health education in improving maternal knowledge and management of neonatal jaundice, thereby promoting better health outcomes for infants

DISCUSSION

The findings from this study indicate that the participants across different groups exhibited similar characteristics, reinforcing the notion that their educational backgrounds and demographic factors did not create a significant disparity in knowledge levels regarding neonatal jaundice (NNJ). Although the control group had a higher mean age, statistical analysis revealed no significant differences in mean age, education levels, or occupation between the groups. This observation aligns with previous research, which found no notable differences between study and control groups in terms of demographic characteristics such as mean age and educational attainment (Khalaf, et al., 2015). Similar findings have been documented regarding factors such as gender distribution, gestational age, and birth weight in both intervention and control groups (Kashaki, et al, 2016, Ragab, et al, 2019).

The current study highlights a significant increase in knowledge among the intervention group following the educational intervention. This is consistent with previous research that demonstrated substantial improvements in knowledge levels post-intervention (Khalaf, et al, 2015). The enhancement in knowledge could be attributed to the educational program's effectiveness in reshaping participants' perceptions of neonatal jaundice, particularly concerning its complications and prevention strategies. For instance, a notable finding was that many participants in both groups were unaware that certain signs, such as the downward turning of the eyes, indicated a serious issue related to jaundice. Additionally, a significant number of participants did not recognize poor feeding as a symptom of NNJ. These gaps in knowledge reflect a broader trend found in other studies, which reported suboptimal awareness levels among mothers regarding the signs and consequences of neonatal jaundice (Hassan, et al, 2018).

Moreover, the study corroborated previous findings indicating that only a small percentage of mothers recognized the potential for NNJ to cause serious complications, such as brain damage. This suggests that many expectant mothers remain unaware of the gravity of untreated jaundice. For instance, while some mothers believed that regular antenatal care could prevent the condition, others held misconceptions, such as the idea that exposure to sunlight could suffice as a preventive measure. These insights resonate with findings from studies in which a significant percentage of mothers exhibited limited knowledge of jaundice-related risks and management strategies (Moawad, et al, 2016, Olatunde, et al, 2020, Huang, et al, 2022).

Post-intervention evaluations revealed that the participants in the experimental group had nearly double the knowledge score regarding the signs of NNJ compared to their control group counterparts. This outcome underscores the efficacy of the educational sessions delivered to the experimental group, significantly enhancing their understanding of NNJ's signs, causes, complications, and management strategies. However, despite these improvements, the knowledge regarding the complications of NNJ remained relatively low in both groups. This suggests that while educational interventions can effectively increase awareness of signs and

causes, they may not adequately address the full spectrum of complications associated with NNJ.

Interestingly, the correlation analysis revealed a significant relationship between mothers' management of NNJ and their knowledge of its causes, but not with its signs and complications. This finding diverges from other studies where a strong relationship was found between maternal management strategies and knowledge of both the signs and causes of jaundice (Donkor, et al., 2023, Saddozai, et al, 2022). This discrepancy may suggest that while participants gained insights into the causes of jaundice, their understanding of its symptoms and complications remained less robust. The implications of this are critical; improved knowledge regarding the signs and complications of NNJ could enhance management practices, reduce risks, and ultimately lead to better neonatal health outcomes (Huang, et al, 2022, Saddozai, et al, 2022).

Hypothesis testing confirmed that the knowledge of pregnant women regarding NNJ had a significant impact on their management practices at the post-intervention phase for the experimental group. This reinforces the notion that enhancing maternal knowledge directly correlates with improved management of NNJ. Studies conducted in Ghana, Pakistan, and Egypt corroborate these findings, demonstrating that educational interventions significantly improve expectant mothers' understanding of NNJ and its management (Kamal, et al, 2022, Saddozai, et al, 2022, Donkor, et al., 2023). However, other research conducted in West Africa highlighted a considerable lack of understanding among mothers regarding NNJ, emphasizing the need for targeted educational programs to raise awareness and knowledge (Amegan-Aho, et al, 2019).

IMPLICATION TO RESEARCH AND PRACTICE

The findings from this study highlight the critical role of health education in improving maternal knowledge of neonatal jaundice (NNJ) and its management. For research, it underscores the need for further studies on the long-term effects of educational interventions and their adaptability across different cultural contexts. In practice, the results suggest that healthcare providers must prioritize continuous education for pregnant women to enhance early detection and intervention for NNJ. Public health campaigns should integrate culturally sensitive educational materials, targeting both urban and rural populations, to ensure widespread awareness and improve neonatal health outcomes. In addition, the implications for clinical and public health practices are clear: mere access to healthcare facilities and diagnostic resources is insufficient to minimize cases of NNJ. There must be ongoing health education initiatives that empower pregnant women with the knowledge necessary for making informed decisions regarding child care and well-being.

CONCLUSION

In conclusion, the results of the current study reveal that the level of knowledge regarding neonatal jaundice among the intervention group increased significantly after the health education sessions, compared to the control group. Additionally, the findings demonstrate that maternal knowledge significantly influences the management of NNJ in the post-intervention phase. The importance of consistent public awareness campaigns cannot be overstated. These campaigns should be conducted in hospitals, health centers, and community gatherings to sensitize expectant mothers about the signs and complications of neonatal jaundice. By fostering a greater understanding among mothers, we can enhance their ability to recognize early symptoms and seek appropriate care, ultimately improving neonatal health outcomes in Kwara State, Nigeria.

FUTURE RESEARCH

Future research should explore long-term retention of knowledge post-intervention, investigate other socio-cultural factors influencing neonatal jaundice awareness, and assess the effectiveness of alternative educational approaches in rural and urban settings.

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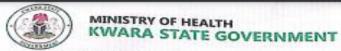
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BABCOCK UNIVERSITY
HEALTH RESEARCH ETHICS COMMITTEE

Our Ref. NHREC/24/01/2020 Your Ref. BUHREC 833/23 Date: January 31, 2024

NAME OF PRINCIPAL INVESTIGATOR: BELLO AYOBANJO D.

TITLE OF STUDY: EFFECT OF EDUCATIONAL INTERVENTION ON PREGNANT WOMEN'S KNOWLEDGE, PERCEPTION AND HEALTH SEEKING BEHAVIOUR ON NEONATAL JAUNDICE IN SELECTED HEALTH FACILITIES IN KWARA STATE.

RESEARCH LOCATION: KWARA STATE, NIGERIA.

NOTIFICATION FOR ETHICAL APPROVAL

Babcock University Health Research Ethics Committee has approved your research proposal and other related materials after the necessary reviews and corrections.

The National code for Health Research Ethics requires that you comply with all institutional guidelines, rules and regulations. All forms and questionnaire must carry the assigned BUHREC number. No changes are permitted in the research without prior approval by the Committee.

Please, note that the Committee will monitor the research study. All data collection must be completed within twelve calendar months (One year), from the date stated on this approval.

You are expected to give a progress report of the investigation and submit a final copy of the research to the Committee.

This approval is with effect from December 12, 2023.

Thank you.

Professor K. O. Ogunwenmo
Chairman, Babcock University Health Research Ethics Committee
09133507122

MINISTRY OF HEALTH
KWARA STATE GOVERNMENT

MOH/KS/EU/777/10010   18th December, 2023.

Re: Effect of Educational Intervention on Pregnant Women's Knowledge, Perception and Health Seeking Behaviour Regarding Neonatal Jaundice in Selected Health Facilities in Ilorin, Kwara State.

Ministry of Health Ethical Research Committee (ERC) Assigned number:
ERC/MOH/2023/12/170
Name of Principal Investigator: **BELLO AYOBANJO DEBORAH**

Address of Investigator: Department of Public Health
School of Public and Allied Health
Babcock University Ilishan Remo, Ogun State.
Telephone: 07032418019
Date of Approval of Application: **18/12/2023**

NOTICE OF APPROVAL TO CARRY OUT RESEARCH

Sequel to your request and the interest of the State Ministry of Health in Health-related research activities to improve the health of the citizens. I am directed to forward to you the approval of the Ministry of Health to carry out the dissertation as itemized in your protocol. The approval I.D is ERC/MOH/2023/12/170.

2.   You are mandated to acknowledge the State Ministry of Health by your presentations/publications and deposition of the final copy of the research findings/publications.

3.   Please kindly note that the Ethical Review Committee reserves the right to conduct monitoring/oversight to your research site without prior notification.

4.   The Approval dates from 18/12/2023 to 17/12/2024, if there is delay in starting the research, please inform the MOH/ERC so that the date of the approval can be adjusted accordingly.

5.   Best wishes in your research project.

Dr B.W Alatishe-Muhammad
Chairman Ethical Review Committee
For: Honourable Commissioner

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