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Factors associated with pregnant women's attitudes toward neonatal jaundice at Thai Binh Obstetrics and Gynecology Hospital in 2025

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ABSTRACT

***Objective**: To identify factors associated with pregnant women's attitudes toward neonatal jaundice at Thai Binh Obstetrics and Gynecology Hospital in 2025. **Methods**: A cross-sectional descriptive study was conducted among 359 pregnant women attending routine antenatal care at Thai Binh Obstetrics and Gynecology Hospital from April 2025 to July 2025. **Results**: the majority were under 35 years old (80.2%) and lived in rural areas (73.5%). Most participants had at least a high school education (76.9%). Multiparous women accounted for 61.0%, and 86.9% had access to information about neonatal jaundice. Nearly half of the participants (47.9%) reported a history of having a child with jaundice. The main sources of information about neonatal jaundice were healthcare workers (48.4%) and the internet (41.9%), while books and manuals were the least common source (3.2%). Factors associated with pregnant women's attitudes toward neonatal jaundice included age ≥35 years (OR = 2.03; 95% CI: 1.20–3.43), urban residence (OR = 1.61; 95% CI: 1.00–2.58), a history of having a child with jaundice (OR = 1.89; 95% CI: 1.09–3.24). **Conclusion**: The study findings indicate that in the multivariable logistic regression model, pregnant women's adequate attitudes toward neonatal jaundice were associated with maternal age and a history of having a child with jaundice ($p < 0.05$).*

***Keywords**: Neonatal jaundice, attitude, pregnant women, associated factors.*

INTRODUCTION

Neonatal jaundice is an important cause of morbidity in newborns. When the level of bilirubin in the blood exceeds the safe threshold, infants are at risk of developing pathological jaundice, which is one of the common causes of hospitalization or readmission during the first week after birth[1]. Worldwide, the estimated prevalence of severe hyperbilirubinemia is approximately 4–5% in Europe and the United States, while it is higher in Asia, ranging from 14–16%[2-5]. Severe jaundice can cause irreversible brain damage or death if not detected and treated promptly.

After childbirth, pregnant women (mothers) are the primary caregivers and play a key role in monitoring and early detection

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of neonatal jaundice. Pregnant women's attitudes directly influence caregiving behaviors and decisions to seek medical services; inappropriate attitudes may lead to delays in detection and management, increasing the risk of serious complications such as cerebral palsy, hearing impairment, and intellectual disability [6].

Many studies have shown that pregnant women's attitudes toward neonatal jaundice remain limited and are influenced by factors such as age, educational level and access to health information [7-9]. A study conducted in Ghana by Seneadza et al. (2022) also reported associations between age, educational level, knowledge, and pregnant women's attitudes [9]. In Vietnam, a study by Tran Hanh Bac reported that only 17.5% of mothers had a good attitude before health education intervention [7], while a study by Ha Thi Duyen et al. (2021) found that 66.7% of pregnant women had adequate attitudes [8]. Hung Yen is a locality with a high proportion of rural population, where access to health information remains limited, and studies on factors associated with pregnant women's attitudes toward neonatal jaundice in this area are still scarce. From this practical context, we conducted this study with the objective of identifying factors associated with pregnant women's attitudes toward neonatal jaundice at Thai Binh Obstetrics and Gynecology Hospital in 2025. The findings of this study may provide evidence for developing appropriate health education interventions to improve pregnant women's attitudes regarding neonatal jaundice. This may contribute to early detection and timely management of neonatal jaundice, thereby improving neonatal health outcomes.

METHODS

Study subjects

Pregnant women attending routine antenatal care.

Inclusion criteria:

Pregnant women attending routine antenatal care at Thai Binh Obstetrics and Gynecology Hospital.

Pregnant women who agreed to participate in the study.

Exclusion criteria:

Pregnant women with insufficient cognitive ability, inability to respond to interviews, mental disorders, or illiteracy.

Study setting

Thai Binh Obstetrics and Gynecology Hospital.

Study duration

From April 2025 to July 2025.

Study design

A cross-sectional descriptive study.

Sample size:

The sample size was calculated using the following formula:

$$n = Z^2_{(1-\alpha/2)} \frac{p(1-p)}{d^2}$$

Where:

n: the number of pregnant women participating in the study.

$Z_{(1-\alpha/2)}$ = 1.96 corresponds to a 95% confidence level, with $\alpha = 0.05$.

p: the proportion of pregnant women with adequate attitudes toward neonatal jaundice. Based on the study by Ha Thi

Duyen et al. (2021) [8], in which 66.7% of pregnant women had adequate attitudes, p was set at 0.667.

d: the allowable margin of error, chosen as 0.05. Substituting these values into the formula yielded n = 342. To account for a potential 5% non-response or loss to follow-up, the sample size was increased accordingly. Thus, the final sample size for this study was 359 pregnant women.

Sampling method:

The study applied a convenience sampling method; pregnant women who met the inclusion criteria were invited to participate throughout the data collection period.

Instrument

The questionnaire consisted of three sections: General information of participants (6 items) included demographic and obstetric characteristics such as age (categorized as <35 and ≥ 35 years), residence (urban/rural), occupation (farmer, worker, civil servant, housewife, trader, and others), educational level (primary school, secondary school, high school, and college/university/ postgraduate), parity (primiparous or multiparous), and history of having a child with neonatal jaundice (yes/no); Sources of information on neonatal jaundice (2 items) assessed whether pregnant women had ever heard about neonatal jaundice (yes/no) and the sources from which they obtained information, such as health workers, family members, friends/colleagues, mass media, the internet, books or manuals, and other sources; Pregnant women's attitudes toward neonatal jaundice (10 items).

The questionnaire and scoring scales were adapted from previous studies by Tran Hanh Bac (2017) and Ha Thi Duyen (2021)[7, 8].

The study used a 4-point Likert scale to assess pregnant women's attitudes toward neonatal jaundice, consisting of 10 items (D1–D10). Among these, six items reflected appropriate attitudes (D1, D3, D5, D7, D8, D10) and four items reflected inappropriate attitudes (D2, D4, D6, D9). For items reflecting appropriate attitudes, responses were scored from 4 to 1 point corresponding to "strongly agree", "agree", "disagree", and "strongly disagree", respectively. For items reflecting inappropriate attitudes, reverse scoring was applied, with scores ranging from 4 points for "strongly disagree" to 1 point for "strongly agree". The total attitude score for the 10 items ranged from 10 to 40 points. Based on the cut-off point of 70% of the total possible score, overall attitudes toward neonatal jaundice were classified into two levels: adequate attitude (≥ 28 points) and inadequate attitude (< 28 points).

After the questionnaire was developed, a pilot test was conducted among 30 pregnant women who met the inclusion criteria (these participants were not included in the final study sample). The reliability of the instrument was assessed using Cronbach's alpha coefficient. The results showed that the attitude scale had a Cronbach's alpha of 0.71. Therefore, the instrument was considered to have acceptable reliability and was used for data collection.

Data collection

The data collection process was conducted in three steps. Pregnant women

who met the inclusion criteria were recruited into the study. Prior to the survey, the investigators provided full information about the study objectives and contents and gave detailed instructions on participation to those who agreed to take part. Data were then collected using a structured questionnaire, which was self-administered by the participants under the supervision of the investigators within approximately 20 minutes. Completed questionnaires were collected and checked for completeness.

Data analysis

Data were entered and analyzed using SPSS version 20.0. The Chi-square test or Fisher's exact test was used to compare proportions. Logistic regression analysis was applied to identify independent associated factors. The results are presented as odds ratios (ORs) with 95% confidence intervals (95% CI). Statistical significance was considered at $p < 0.05$.

Ethical considerations

The study was conducted after approval by the Scientific Council of Thai Binh University of Medicine and Pharmacy under Decision No. 531/QD-YDTB dated March 11, 2025, and with permission from the Board of Directors of Thai Binh Obstetrics and Gynecology Hospital.

Participation in the study was entirely voluntary, and all pregnant women were provided with full information regarding the objectives and significance of the study prior to participation.

All information related to the study participants was kept confidential. The collected data ensured objectivity and were used solely for research purposes.

RESULTS

Table 1. General characteristics of the study participants

General characteristics of the study participants	Frequency (n)	Percentage (%)
Age group		
≥ 35 years	71	19.8
< 35 years	288	80.2
Residence		
Urban	95	26.5
Rural	264	73.5
Educational level		
≥ High school education	276	76.9
< High school education	83	23.1

General characteristics of the study participants	Frequency (n)	Percentage (%)
Parity		
Multiparous	219	61.0
Primiparous	140	39.0
Access to information		
Yes	312	86.9
No	47	13.1
History of having a child with jaundice		
Yes	105	47.9
No	114	52.1

Table 1 shows that the general characteristics of the study participants. The majority of participants were under 35 years old (80.2%). Most lived in rural areas (73.5%). Regarding educational level, 76.9% had at least a high school education. Multiparous women accounted for 61.0%, while primiparous women represented 39.0%. Most participants had access to information (86.9%). In addition, 47.9% reported a history of having a child with jaundice, while 52.1% did not.

Table 2. Sources of information on neonatal jaundice (n = 312)

Sources of information on neonatal jaundice	Frequency (n)	Percentage (%)
Healthcare workers	151	48.4
Family members	20	6.4
Friends, colleagues	26	8.3
Mass media	40	12.8
Internet	131	41.9
Books, manuals	10	3.2

Table 2 shows that the most common source of information about neonatal jaundice among pregnant women was healthcare workers (48.4%), followed by the internet (41.9%) and mass media (12.8%). The least common source was books and manuals (3.2%).

Table 3. Association between pregnant women's attitudes toward neonatal jaundice and selected characteristics of the study participants

General characteristics of the study participants	Attitude		OR (95% CI)	p
	Adequate n (%)	Inadequate n (%)		
Age group				
≥ 35 years	39 (54.9)	32 (45.1)	2.03 (1.2 – 3.43)	0.007
< 35 years	108 (37.5)	180 (62.5)		
Residence				
Urban	47 (49.5)	48 (50.5)	1.61 (1.00 – 2.58)	0.049
Rural	100 (37.9)	164 (62.1)		
Educational level				
≥ High school education	113 (40.9)	163 (59.1)	0.99 (0.61 – 1.65)	0.99
< High school education	34 (41.0)	49 (59.0)		
Parity				
Multiparous	97 (44.3)	122 (55.7)	1.43 (0.93 – 2.22)	0.11
Primiparous	50 (35.7)	90 (64.3)		
Access to information				
Yes	129 (41.3)	183 (58.7)	1.14 (0.61 – 2.13)	0.69
No	18 (38.3)	29 (61.7)		
History of having a child with jaundice				
Yes	55 (52.4)	50 (47.6)	1.89 (1.09 – 3.24)	0.02
No	42 (36.8)	72 (63.2)		

Note: Data are presented as n (%). The Chi-square test was used to compare proportions between groups. OR: Odds Ratio; CI: Confidence Interval. Statistical significance was defined as $p < 0.05$.

Table 3 shows that pregnant women aged 35 years and older had a higher proportion of adequate attitudes toward neonatal jaundice compared with those under 35 years of age. This difference was statistically significant ($p < 0.05$; OR = 2.03; 95% CI: 1.20–3.43).

Regarding place of residence, pregnant women living in urban areas had a higher proportion of adequate attitudes than those living in rural areas. This difference was also statistically significant ($p < 0.05$; OR = 1.61; 95% CI: 1.00–2.58).

The study results did not find any statistically significant differences between attitudes toward neonatal jaundice and educational level or parity of the study participants ($p > 0.05$).

The study results showed that pregnant women who had access to information about neonatal jaundice had a higher proportion of adequate attitudes compared with those who did not have access to such information; however, this difference was not statistically significant ($p > 0.05$; OR = 1.14; 95% CI: 0.61–2.13).

Pregnant women who had previously had a child with jaundice had a higher proportion of adequate attitudes toward neonatal jaundice compared with those without such a history. This difference was statistically significant ($p < 0.05$; OR = 1.89; 95% CI: 1.09–3.24).

Table 4. Association between attitudes and other factors (multivariable logistic regression)

Variables	Attitude		
	B	OR (95% CI)	p
Residence			
Rural (Ref)	-	1.00	-
Urban residence	0.32	1.38 (0.74 – 2.6)	0.31
Age group			
< 35 years (Ref)	-	1.00	-
Age group ≥ 35 years	0.74	2.09 (1.09 – 4.01)	0.03
History of having a child with jaundice			
No (Ref)	-	1.00	-
Yes	0.68	1.97 (1.09 – 3.58)	0.03

Note: B: Regression coefficient; OR: Odds Ratio; CI: Confidence Interval; Ref: Reference group. Multivariable logistic regression was used to identify factors associated with attitudes. Statistical significance was set at $p < 0.05$.

Table 4 shows that after multivariable logistic regression analysis, the results showed that pregnant women aged ≥ 35 years had a higher likelihood of having adequate attitudes compared with those aged < 35 years. This difference was statistically significant (p = 0.03; OR = 2.09; 95% CI: 1.09–4.01).

Pregnant women with a history of having a child with jaundice were more likely to have adequate attitudes than those without such a history. This difference was also statistically significant (p = 0.03; OR = 1.97; 95% CI: 1.09–3.58).

The difference between place of residence and the overall attitude of pregnant women toward neonatal jaundice was not statistically significant (p > 0.05).

DISCUSSION

The results of this study conducted among 359 pregnant women showed that the majority were under 35 years old (80.2%), which is similar to the findings of Amegah-Aho et al. (2019) (85.7%) [9] but higher than the study by Ha Thi Duyen (2021) (72.5%) [8]. This indicates that most participants were within the optimal reproductive age, which may reduce the risk of pregnancy-related complications commonly observed in women aged ≥ 35 years.

Regarding residence, most pregnant women lived in rural areas (73.5%), compared with 26.5% living in urban areas. This finding is is lower than the findings of Ha Thi Duyen (2021), where 84.3% of participants lived in urban areas [8], and the study by Demiss et al. (2021) (69.7%) [10]. These differences may be explained by the characteristics of the study setting, as Thai Binh Obstetrics and Gynecology Hospital serves as the provincial referral hospital and receives many pregnant women from rural districts within the province.

In terms of educational level, the majority of pregnant women had at least a high school education (76.9%). This finding is consistent with the study by Nguyen Thi To Nga (2020)[11], but lower than that reported by Ha Thi Duyen (2021) (80.4%) [8]. This difference may be attributed to the fact that most participants in the present study resided in rural areas, where access to higher education opportunities is more limited.

Additionally, 61% of pregnant women had given birth two or more times, which is comparable to the findings of Ha Thi Duyen (2021) (64.7%) [8]. Notably, 47.9% of participants reported a history of having a child with neonatal jaundice, which is considerably higher than the proportions reported by Amegah-Aho et al. (2019) (4.5%) [9]. This difference may be related to the increasing attention given to the detection and documentation of neonatal jaundice in postnatal care.

The results also showed that the majority of pregnant women (86.9%) had heard of or were aware of neonatal jaundice. The main sources of information were healthcare workers (48.4%) and the internet (41.9%). The proportion of participants receiving information from healthcare workers was higher than that reported in the study by Amegah-Aho et al. (2019) [9]. These findings highlight the important role of healthcare workers as a key source of information in

educating pregnant women about neonatal care, particularly in the recognition and management of neonatal jaundice.

The study results showed significant differences in attitudes toward neonatal jaundice according to age group and residence. Pregnant women aged ≥ 35 years had a higher proportion of adequate attitudes compared with those under 35 years of age ($p < 0.05$; OR = 2.03; 95% CI: 1.20–3.43), while those living in urban areas also had higher levels of adequate attitudes than those living in rural areas ($p < 0.05$; OR = 1.61; 95% CI: 1.00–2.58). This may be explained by the fact that older pregnant women often have more experience in childcare and greater concern for their children's health, which contributes to the development of more positive attitudes. In addition, living in urban areas offers advantages in accessing healthcare services and scientific information, thereby enhancing both awareness and attitudes among pregnant women. However, the study by Seneadza et al. (2022) conducted in Ghana did not report a statistically significant association between attitudes and place of residence, which may be attributable to differences in healthcare systems, cultural factors, as well as study design and assessment tools [12]. In Vietnam, pregnant women living in urban areas generally have better access to health information and healthcare services than those in rural areas, which may lead to more positive attitudes toward neonatal jaundice.

Overall, the findings highlight that age plays an important role in shaping appropriate attitudes, and that place of residence also has a clear influence. These results suggest that health communication and education programs should place greater emphasis on younger and rural pregnant women in order to narrow gaps in awareness, improve attitudes, and strengthen appropriate caregiving behaviors, thereby reducing the risk of complications related to neonatal jaundice.

The study results showed that pregnant women who had previously had a child with jaundice exhibited more positive attitudes toward neonatal jaundice compared with those who had never had a child with jaundice. This difference was clearly statistically significant ($p < 0.05$; OR = 1.89; 95% CI: 1.09–3.24). This finding reflects the important role of real-life experience in shaping and reinforcing pregnant women's attitudes. Direct experience in caring for a jaundiced infant may improve mothers' awareness and promote more cautious attitudes toward the condition. However, this result also highlights a limitation: pregnant women who have never had a child with jaundice tend to have less appropriate attitudes, as they may lack exposure to practical information or sufficient concern about the condition. If reliance is placed solely on personal experience, many mothers may not be adequately equipped before facing potential risks, leading to delays in detection and management.

Therefore, health communication and education efforts should proactively provide accurate and evidence-based information on neonatal jaundice to all pregnant women, regardless of whether they have previously had a child with jaundice. This approach will help to uniformly improve attitudes,

ensuring that all mothers are capable of early detection, prevention of complications, and timely management of neonatal jaundice.

The study results did not find any statistically significant differences in attitudes toward neonatal jaundice among groups with different educational levels ($p > 0.05$). This finding may be explained by the fact that pregnant women nowadays can access health information from various sources. Therefore, even those with lower educational levels may still receive necessary information about the care and recognition of neonatal jaundice, which may reduce differences in attitudes between educational groups. This finding suggests that appropriate attitudes toward neonatal jaundice do not depend solely on educational attainment but may be influenced by other factors such as childcare experience, the level of family involvement, and the impact of health communication and community influences [10].Therefore, to improve pregnant women's attitudes, it is necessary to implement a comprehensive approach that combines psychological support, health communication, and individualized counseling, rather than focusing only on educational level.

The survey results also showed that although pregnant women who accessed information from multiple sources had a higher proportion of appropriate attitudes compared with those who did not access information, this difference was not statistically significant ($p > 0.05$). This indicates that pregnant women's attitudes may be shaped by other factors, including personal beliefs, cultural practices, family support, and real-life childcare experiences. These findings suggest that, in addition to increasing the provision of information, health communication programs should place greater emphasis on changing perceptions and behaviors by incorporating direct counseling, group discussions, and interactive health education activities. Such approaches are essential for transforming attitudes and appropriate actions in newborn care.

The study also did not find a statistically significant association between attitudes toward neonatal jaundice and the current number of children of the study participants ($p > 0.05$). This suggests that parity alone is not a decisive factor influencing pregnant women's attitudes. Accurate perceptions of neonatal jaundice are more likely to depend on access to information, personal concern, and the effectiveness of health communication and education efforts [8, 13, 14]. These results indicate the need to implement comprehensive communication programs targeting all groups of pregnant women. Univariable logistic regression analysis showed that several factors were associated with pregnant women's attitudes toward neonatal jaundice, including age group, place of residence, and a history of having a child with jaundice. However, when these variables were entered into the multivariable regression model, the results indicated that pregnant women aged 35 years and older were 2.09 times more likely to have adequate attitudes than those under 35 years of age ($p = 0.03$; 95% CI: 1.09–4.01). In addition, pregnant women with a history of having a child with jaundice were almost twice as likely to have adequate

attitudes compared with those without such a history (p = 0.03; OR = 1.97; 95% CI: 1.09–3.58). Thus, both age and practical experience play important roles in shaping positive attitudes toward neonatal jaundice. In contrast, place of residence did not show a significant association after adjustment, suggesting that pregnant women's attitudes are less influenced by geographical factors once other variables are controlled for.

Overall, the findings indicate that practical experience, reflected by a history of having a child with jaundice, together with maternal age, are key factors contributing to the development of positive attitudes toward neonatal jaundice. Moreover, strengthening health communication and promoting appropriate attitudes are considered crucial elements.

CONCLUSION

The study findings indicate that in the multivariable logistic regression model, pregnant women's adequate attitudes toward neonatal jaundice were associated with maternal age and a history of having a child with jaundice ($p < 0.05$). These findings highlight the importance of strengthening health education for pregnant women, particularly younger mothers and those without prior experience caring for a jaundiced newborn. Improving pregnant women's attitudes may contribute to earlier detection and timely management of neonatal jaundice, thereby reducing the risk of severe complications in newborns.

LIMITATIONS

The study was conducted at Thai Binh Obstetrics and Gynecology Hospital with a relatively limited sample size; therefore, the findings may not fully represent all pregnant women in the community. In addition, the study used a cross-sectional design, which only reflects the associations between factors and pregnant women's attitudes toward neonatal jaundice at the time of the survey. Furthermore, the data were collected through a self-reported questionnaire, which may be subject to information bias.

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