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Knowledge, Attitudes, and Motivation Regarding Exclusive Breastfeeding Between Medical and Nonmedical Students: A Cross-Sectional Study

Melviana Lubis

Department of Pharmacology, Faculty of Medicine, Universitas Muhammadiyah Sumatera Utara, Medan 20238, Indonesia, melvianalubis@umsu.ac.id

Meisyah Putri Rozi

Department of Medical Education, Faculty of Medicine, Universitas Muhammadiyah Sumatera Utara, Medan 20238, Indonesia

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Knowledge, Attitudes, and Motivation Regarding Exclusive Breastfeeding Between Medical and Nonmedical Students: A Cross-Sectional Study

Melviana Lubis^{1*} , Meisyah Putri Rozi²

¹Department of Pharmacology, Faculty of Medicine, Universitas Muhammadiyah Sumatera Utara, Medan 20238, Indonesia

²Department of Medical Education, Faculty of Medicine, Universitas Muhammadiyah Sumatera Utara, Medan 20238, Indonesia

Abstract

Background: Exclusive breastfeeding provides substantial health benefits; however, disparities in knowledge and support persist. This study aimed to compare knowledge levels, attitudes, and motivation levels regarding exclusive breastfeeding between female medical and nonmedical students.

Methods: A cross-sectional survey was conducted at Universitas Muhammadiyah Sumatera Utara and involved 314 students from the 2023 cohort. A validated questionnaire was used to assess knowledge levels (16 items), attitude (IIFAS, 16 items), and motivation (15 items). Data were analyzed using the chi-square test, odds ratio (OR), and Spearman's correlation.

Results: Medical students demonstrated significantly higher levels of knowledge (OR = 3.50; 95% CI: 1.93–6.33; $p < 0.001$), attitude (OR = 2.19; 95% CI: 1.34–3.58; $p = 0.001$), and motivation (OR = 2.81; 95% CI: 1.62–4.85; $p < 0.001$) toward exclusive breastfeeding than nonmedical students. However, misconceptions remain regarding the equivalence of formula to breast milk and the acceptability of breastfeeding in public. A moderate positive correlation was observed between knowledge and motivation levels ($\rho = 0.375$, $p < 0.001$).

Conclusion: Although structured health education enhances students' breastfeeding perspectives, it does not completely address sociocultural and practical barriers. Broader, interdisciplinary education and supportive environments may better prepare students as future mothers and breastfeeding advocates.

Keywords: attitudes, breastfeeding, health education, motivation, students

INTRODUCTION

Exclusive breastfeeding (EBF) refers to feeding infants only breast milk, with no additional food or drink except for oral rehydration solutions, vitamins, minerals, or medicines. Breast milk is the optimal source of nutrition for infants aged 0–6 months because of its benefits on the immune system and development. Breast milk provides antibodies that protect against infections, thereby reducing infant mortality from common illnesses such as diarrhea and pneumonia.^{1–3} Despite its proven advantages, only 63% of infants globally are exclusively breastfed.³ According to the World Health Organization, only 44% of infants aged 0–6 months were exclusively breastfed during 2015–2020, falling short of the global target of 50%.⁴ In Indonesia, exclusive breastfeeding coverage for infants aged 6–23 months declined from 64.5% in 2019 to 55.5% in 2023. In North Sumatra Province, the rate is even lower at 43.9%, highlighting a significant regional gap.⁵

Previous studies have identified maternal knowledge as the most influential factor affecting exclusive breastfeeding, followed by beliefs about its benefits, perceptions of adequacy, family support, psychological readiness, economic conditions, and employment.^{6,7} Maternal education is also strongly associated with breastfeeding practices. In Indonesia, women who have attained higher education are 1.231 times more likely to exclusively breastfeed than those with no formal education.⁸ University students, particularly those in health-related fields, represent an important population for studying. They are future mothers who can serve as health advocates in their communities. However, despite their presumed access to accurate health information, studies have reported persistent knowledge gaps, even among medical students.⁹ Findings from international studies are consistent with this trend. In Pakistan, Saudi Arabia, and Nigeria, university students often demonstrated limited understanding and mixed attitudes toward breastfeeding.^{9–11} Even nursing students with strong theoretical knowledge did not always demonstrate positive attitudes or intentions to breastfeed.

Medical students tend to demonstrate higher levels of general and digital health literacy than their nonmedical peers.^{12–15} This finding may be attributed to a broader understanding of maternal and child health among medical

*Corresponding author:

Melviana Lubis
Department of Pharmacology, Faculty of Medicine,
Universitas Muhammadiyah Sumatera Utara, Medan, Indonesia
E-mail: melvianalubis@umsu.ac.id

students. However, academic training is not the only influencing factor. Family environment, media exposure, and personal health-seeking behavior also play key roles in shaping students' perspectives.^{9,16} Considering these multiple influences, it is necessary to understand the associations between academic background and other determinants that affect breastfeeding awareness. This study hypothesized that medical students have significantly higher knowledge levels, attitudes, and motivation toward exclusive breastfeeding than their nonmedical peers. This study was conducted at Universitas Muhammadiyah Sumatera Utara, a private university in North Sumatra that offers a range of academic programs across multiple faculties. This institution serves as a suitable setting for examining differences between student groups. This study aimed to compare knowledge levels and attitudes between female students in the Faculty of Medicine and those in nonmedical faculties and assess whether these factors are positively associated with motivation for future breastfeeding practices.

METHODS

This cross-sectional analytical study was conducted from February to May 2024 at Universitas Muhammadiyah Sumatera Utara in Medan, Indonesia. This research has received approval from the Health Research Ethics Commission (KEPK) of the Faculty of Medicine, University of Muhammadiyah North Sumatra, with registration number 1139/KEPK/FKUMSU/2024. Data were collected from the Faculty of Medicine (medical students) and the Faculty of Economics and Business (nonmedical students). The study population comprised female undergraduate students from the 2023 cohort, and a total sampling method was used. The inclusion criteria included being a female student enrolled in one of the two faculties in 2023 and providing voluntary informed consent. Students who declined to complete the questionnaire were excluded. Age was recorded as part of the demographic data. Because all participants were from the same cohort, substantial differences in age were not anticipated. Differences in age distribution between medical and nonmedical students were analyzed using the Mann-Whitney *U* test.

The questionnaire comprised three primary domains: knowledge, attitude, and motivation toward EBF. Knowledge level was assessed using 16 multiple-choice items (scored 0–1; total score range: 0–16), with scores $\geq 70\%$ categorized as high. Attitude was assessed using 16 items adapted from the Iowa Infant Feeding Attitude Scale (IIFAS), scored on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The total score range is 16–80. Higher scores indicate a more positive attitude toward breastfeeding. Reverse scoring was applied to IIFAS items favoring formula feeding, which were items number 1, 2, 4, 6, 8, 10, 11, and 14. A score ≥ 56 (70%) was considered a positive attitude.

The IIFAS has been previously translated into the Indonesian language and validated, showing strong internal consistency (Cronbach's alpha > 0.70).¹⁷ The scale has also been validated among university student populations in other countries, indicating its applicability in this context.^{18,19} Motivation was assessed using 15 dichotomous items (scored 0–15), with scores $\geq 70\%$ indicating high motivation. Although participants had no previous experience with breastfeeding, motivation was interpreted as the intention to breastfeed in the future, consistent with the findings of previous studies on nulliparous university women.¹⁸ All three domains have demonstrated acceptable internal consistency in previous studies (Cronbach's alpha > 0.60). The 70% cutoff was based on conventional academic benchmarks and widely used survey research practices. Floor and ceiling effects were assessed for each domain. The knowledge and motivation scales showed moderate ceiling effects (24.8% and 16.6%, respectively), whereas the attitude scale showed minimal ceiling effects (2.2%). No significant floor effects were observed. Data were analyzed using SPSS version 25. Descriptive statistics were used for demographic variables. The chi-square test (or Fisher's exact test when assumptions were violated) was used to assess differences between groups. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated to quantify the associations. The association between knowledge levels and motivation was assessed using Spearman's rank correlation. All statistical tests were two-tailed, with *p*-values < 0.05 considered statistically significant. This study was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies.²⁰

RESULTS

A total of 329 female students were invited to participate in the study. After applying the inclusion and exclusion criteria, 314 students who completed the questionnaire were included in the final analysis, resulting in a response rate of 95.4%. The final sample comprised 189 medical students and 125 nonmedical students. The majority of participants were 18 years old (64.0%), and the rest ranged from 17 to 20 years of age. Table 1 presents the sociodemographic characteristics and distribution of knowledge, attitude, and motivation levels related to exclusive breastfeeding.

Overall, 81.2% of the respondents demonstrated high knowledge levels, 71.0% exhibited a positive attitude, and 78.0% had high motivation toward exclusive breastfeeding. Compared with nonmedical students, medical students had a markedly higher proportion of respondents with high knowledge levels (88.9% vs. 69.6%), positive attitude (77.8% vs. 60.8%), and strong motivation (85.2% vs. 67.2%) toward exclusive breastfeeding. The chi-square test confirmed these group differences, and ORs with 95% CIs

were calculated using the Mantel-Haenszel method. The odds of having high knowledge levels were 3.5 times greater among medical students (OR = 3.50; 95% CI: 1.93–6.33; $p < 0.001$). Similarly, the odds of having a positive attitude and strong motivation were also significantly higher among medical students (OR = 2.19; 95% CI: 1.34–3.58; $p = 0.001$ and OR = 2.81; 95% CI: 1.62–4.85; $p < 0.001$, respectively).

The questionnaire was analyzed to better understand these differences. The item-wise analysis of the knowledge questionnaire is presented in Table 3. Both groups scored high on items regarding the nutritional and immunological benefits of breast milk, the importance of colostrum, and the importance of early breastfeeding initiation. However, correct response rates were lower (<80%) for items addressing misconceptions such as formula milk has the same content as breast milk, formula is easier to digest, and breastfeeding changes breast anatomy.

Insights into the IIFAS item scores are presented in Table 4. The total attitude scores were 56.36 ± 17.06 for medical students and 57.49 ± 17.13 for nonmedical students. The highest mean item scores in both groups reflected agreement with statements that breast milk is ideal and easy to digest. Conversely, lower mean scores were noted for items addressing public breastfeeding and the convenience of formula feeding.

As shown in Table 5, the motivation-related items showed strong agreement from both groups on the importance of breastfeeding as part of a mother's role, the value of colostrum, and the influence of family and healthcare support. However, differences were observed for certain items such as breastfeeding while fatigued, embarrassment in public settings, and the tendency to use formulas when busy. Medical students were more likely to report favorable responses to these items.

Spearman correlation analysis revealed a moderate but significant positive relationship between knowledge and motivation ($\rho = 0.375$, $p < 0.001$).

TABLE 1. The distribution of the respondents (N = 472)

Variable	N (%)
Age (years)	
17	5 (1.59)
18	201 (64.0)
19	105 (33.4)
20	3 (0.9)
Level of knowledge	
High	255 (81.2)
Low	59 (18.7)
Level of attitude	
High	223 (71.0)
Low	91 (28.9)
Level of motivation	
High	245 (78.0)
Low	69 (21.9)

TABLE 2. Comparison of the levels of knowledge, attitudes, and motivation regarding breastfeeding between female medical and nonmedical students

Category	Medical Student (N = 189)	Nonmedical Student (N = 125)	p^*
	N (%)	N (%)	
Level of knowledge			< 0.001
High	168 (88.9)	87 (69.6)	
Low	21 (11.1)	38 (30.4)	
Level of attitude			0.001
High	147 (77.8)	76 (60.8)	
Low	42 (22.2)	49 (39.2)	
Level of motivation			< 0.001
High	161 (85.2)	84 (67.2)	
Low	28 (14.8)	41 (32.8)	

*Groups were compared using a chi-square test

TABLE 3. Distribution of correct responses on exclusive breastfeeding knowledge by group

Item no.	Statement	Medical Student (N = 189)	Nonmedical Student (N = 125)	Total
		N (%)	N (%)	N (%)
1	Exclusive breastfeeding is provided to babies until they are 6 months old	163 (86.2)	100 (80.0)	263 (83.7)
2	Breast milk contains complete nutrients according to the baby's needs	184 (97.4)	116 (92.8)	300 (95.5)
3	Formula milk has the same content as breast milk	145 (76.7)	78 (62.4)	223 (71.0)
4	Breast milk contains immune components that protect the baby from diseases	183 (96.8)	123 (98.4)	306 (97.4)
5	Mothers who exclusively breastfeed have a reduced risk of developing breast cancer	173 (91.5)	102 (81.6)	275 (87.5)
6	Colostrum is the first breast milk produced after childbirth	183 (96.8)	118 (94.4)	301 (95.8)
7	Exclusive breastfeeding can strengthen the bond between the mother and baby	186 (98.4)	123 (98.4)	309 (98.4)
8	Early breastfeeding initiation is performed immediately after the baby is born	187 (98.9)	119 (95.2)	306 (97.4)

TABLE 3. Continues

Item no.	Statement	Medical Student (N = 189)	Nonmedical Student (N = 125)	Total
		N (%)	N (%)	N (%)
9	Breast milk (ASI) often causes diarrhea in babies	166 (87.8)	101 (80.8)	267 (85.0)
10	If the mother is working, breast milk can be replaced with formula milk	109 (57.7)	62 (49.6)	171 (54.4)
11	Colostrum plays an important role in the development of the baby's immunity	183 (96.8)	121 (96.8)	304 (96.8)
12	Healthy food can facilitate breast milk secretion	185 (97.9)	120 (96.0)	305 (97.1)
13	Breast milk is the ideal food choice for babies	187 (98.9)	121 (96.8)	308 (98.0)
14	Formula milk is easier to digest than breastmilk	164 (86.8)	89 (71.2)	253 (80.5)
15	Breastfeeding can change the breast anatomy	136 (72.0)	88 (70.4)	224 (71.3)
16	The baby should be burped immediately after breastfeeding	174 (92.1)	93 (74.4)	267 (85.0)

TABLE 4. Distribution of mean scores for individual IIFAS items by student group (Mean \pm SD)

Item no.	Item variable	Medical Student (N = 189)	Nonmedical Student (N = 125)
1	The nutritional benefits of breast milk last only until the baby is weaned from breast milk	3.31 \pm 1.37	3.04 \pm 1.33
2	Formula feeding is more convenient than breastfeeding	2.59 \pm 1.32	2.91 \pm 1.39
3	Breastfeeding increases mother–infant bonding	2.41 \pm 1.37	2.43 \pm 1.42
4	Breast milk lacks iron	4.56 \pm 0.59	4.38 \pm 0.86
5	Formula-fed babies are more likely to be overfed than breastfed babies	3.46 \pm 1.23	3.85 \pm 0.91
6	Formula feeding is a better option if a mother plans to work outside the home	3.11 \pm 1.20	3.52 \pm 1.06
7	Mothers who use formula feeding miss out on one of the unique joys of motherhood	3.85 \pm 1.10	3.72 \pm 0.84
8	Women should not breastfeed in public places such as restaurants	2.68 \pm 1.33	3.14 \pm 1.30
9	Babies fed breast milk are healthier than those fed formula	4.38 \pm 0.73	4.16 \pm 0.96
10	Breastfed babies are more likely to be overfed than formula-fed babies	2.97 \pm 1.30	3.17 \pm 1.22
11	Fathers feel excluded when the mother breastfeeds	2.65 \pm 1.45	2.74 \pm 1.41
12	Breast milk is the ideal food for babies	4.56 \pm 0.54	4.52 \pm 0.61
13	Breast milk is more easily digested than formula	4.54 \pm 0.63	4.48 \pm 0.71
14	Formula is as healthy for a baby as breast milk	2.82 \pm 1.14	3.24 \pm 1.19
15	Breastfeeding is more convenient than formula feeding	4.32 \pm 0.81	4.05 \pm 0.93
16	Breast milk is less expensive than formula	4.15 \pm 0.95	4.14 \pm 0.99
	Total	56.36 \pm 17.06	57.49 \pm 17.13

TABLE 5. Distribution of correct responses on exclusive breastfeeding motivation by group

Item no.	Statement	Medical Student (N = 189)	Nonmedical Student (N = 125)	Total (N = 314)
		N (%)	N (%)	N (%)
1	The mother understands that breastfeeding her baby is part of her natural role as a mother	184 (97.4)	118 (94.4)	302 (96.1)
2	Mother feels worried if her baby does not receive the first breast milk (colostrum) from her	185 (97.9)	119 (95.5)	304 (96.8)
3	The mother feels that the baby's development is better with breastfeeding	184 (97.4)	121 (96.8)	305 (97.1)
4	The mother breastfeeds her baby even when feeling tired after completing daily tasks	180 (95.2)	109 (87.2)	289 (92.0)
5	The mother will continue to learn about how to provide proper breastfeeding for the baby	187 (98.9)	119 (95.2)	306 (97.4)
6	Family members support the mother in providing exclusive breastfeeding	187 (98.9)	120 (96.0)	307 (97.7)
7	When busy, does the mother give formula milk to the baby?	106 (56.1)	60 (48.0)	166 (52.9)
8	The mother feels embarrassed when breastfeeding in a crowded setting	88 (46.6)	63 (50.4)	151 (48.0)
9	The mother is reluctant to breastfeed the baby because formula milk can also serve as food for the baby	165 (87.3)	76 (60.8)	241 (76.7)

TABLE 5. Continues

Item no.	Statement	Medical Student (N = 189)	Nonmedical Student (N = 125)	Total (N = 314)
		N (%)	N (%)	N (%)
10	The mother feels that her relationship with friends is disrupted when breastfeeding the baby	162 (85.7)	91 (72.8)	253 (80.5)
11	The mother provides exclusive breastfeeding to the baby as an awareness of her role as a mother	181 (95.8)	118 (94.4)	299 (95.2)
12	The doctor supports the mother in providing exclusive breastfeeding to the baby	187 (98.9)	120 (96.0)	307 (97.7)
13	The mother will continue to provide exclusive breastfeeding, even though formula milk advertisements on television are more convincing in promoting a healthier baby	178 (94.2)	115 (92.0)	293 (93.3)
14	The mother feels burdened when providing exclusive breastfeeding to the baby	174 (92.1)	111 (88.8)	285 (90.7)
15	The mother breastfeeds the baby to save money	129 (68.3)	73 (58.4)	202 (64.3)

DISCUSSION

The primary objective of this study was to explore and compare the levels of knowledge, attitudes, and motivation regarding exclusive breastfeeding among female medical and nonmedical students at Universitas Muhammadiyah Sumatera Utara. As anticipated, students in the medical faculty, who are formally taught about maternal and child health, demonstrated significantly higher scores across all three domains. This finding aligns with those reported in previous studies showing that formal health education positively affects breastfeeding-related knowledge and attitudes.^{21,22}

Most medical students recognized key aspects such as the immunological value of breast milk, including the presence of immunoglobulin A, lactoferrin, and oligosaccharides.²³ However, although the overall knowledge scores were high, gaps remained in certain items. One such example was the misconception that formula milk is nutritionally equivalent to breast milk. This may reflect the influence of aggressive formula marketing, particularly in developing countries.²⁴ Research shows that such marketing can mislead public perception and reduce confidence in breastfeeding.²⁵

A similar misconception was observed regarding the compatibility of breastfeeding with employment. Knowledge about milk expression and storage was limited, which is consistent with findings from Kenya and Indonesia that highlight the need for workplace breastfeeding support and infrastructure.^{26,27} Furthermore, few students, both from medical and nonmedical backgrounds, were aware of the digestive superiority of breast milk over formula, despite extensive evidence on its optimal protein and fat content for infant digestion.²⁸

Attitudes, assessed via the IIFAS, revealed that medical students had more positive views on breastfeeding, particularly regarding its health benefits. However, socio-

cultural discomfort with public breastfeeding was evident in both groups. This finding is consistent with previous studies indicating persistent stigma around public breastfeeding, even among healthcare students.^{28,29} Items reflecting the convenience of formula feeding for working mothers also scored higher among nonmedical students, possibly due to their limited exposure to practical breastfeeding solutions.³⁰ These patterns support the Theory of Planned Behavior, which emphasizes the role of attitudes in shaping intentions.³¹

In terms of motivation, although medical students expressed a higher intent to breastfeed, several items indicated hesitations rooted in practical barriers. Notably, the idea that breastfeeding helps save money received less agreement, suggesting a disconnect between academic knowledge and real-world economic considerations. Previous studies have indicated that both medical curricula and public discourse often underemphasize the cost-effectiveness of breastfeeding.^{28,32} Additionally, motivations were influenced by self-efficacy and perceived social norms, which can be shaped by ideational factors such as exposure, empathy, and expected behavior.³³ A significant positive correlation was observed between knowledge and motivation. This finding supports the hypothesis that improving education can enhance the intention to breastfeed. The Health Belief Model suggests that increased knowledge about health benefits can positively influence the motivation to adopt healthy behavior.³⁴ Thus, enhancing educational interventions may simultaneously strengthen students' intention to breastfeed.

This study has several limitations. First, the use of a cross-sectional analytical design limits the ability to establish causality, as the data reflect conditions only at a single time point. Second, although a total population sampling method was used to include all eligible female students from the 2023 cohort in the two selected faculties, the study was conducted in a single institution, which may

limit the generalizability of the findings to other academic or cultural contexts. Third, data collection was based on self-reported questionnaires, which may be subject to social desirability bias, particularly on sensitive topics such as breastfeeding. Although the survey was anonymous and used validated instruments such as the IIFAS, participants might have responded in ways perceived as socially or academically appropriate. Furthermore, the exclusive focus on female students indicates that the findings may not capture male perspectives on breastfeeding education or advocacy. Additionally, the study did not incorporate qualitative components, which could have provided deeper insights into students' underlying beliefs, cultural influences, or personal motivations regarding breastfeeding. Future studies should consider mixed-methods approaches, the inclusion of multiple academic years and institutions, and a more gender-diverse participant base to enhance representativeness and interpretive depth.

CONCLUSIONS

Curriculum development should consider integrating breastfeeding education into a wider range of academic programs. Additionally, efforts should include supportive policies, awareness campaigns, and practical resources to equip students as future parents and health advocates with the tools and confidence to support and practice exclusive breastfeeding. These findings provide preliminary insights that may support the development of targeted educational interventions at the university level and inform localized strategies to promote exclusive breastfeeding awareness among future mothers.

CONFLICT OF INTEREST

None declared.

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