

ORIGINAL ARTICLE

Knowledge and Attitudes Regarding Donated Milk and their Socio-demographic Predictors in Healthcare Providers in Tabriz, 2021: A Cross-sectional Study

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ABSTRACT

Background: Donated milk is the best choice for infants who cannot receive breast milk from their mothers. Researchers in this study evaluated the knowledge and attitude of healthcare providers regarding milk-donation and examined their socio-demographic predictors in Tabriz-Iran, 2021.

Methods: In this cross-sectional analytic study, the total sample size consisted of 535 healthcare providers including 272 nurses and midwives working at maternal hospitals and 263 healthcare providers working at healthcare-centers. Census-sampling method was used during October 2020 to February 2021, and data collection tools included socio-demographic, knowledge and attitude questionnaires. Pearson-correlation test, independent t-test, one-way analysis of variance, and adjusted general linear model were used to analyze the data using SPSS version 16.

Results: The mean (SD) of the knowledge score was 12.04 ± 4.30 (score range of 0-22) and that of the attitude score was 134.27 ± 20.23 (score range of 42-210). Results of general linear model was adjusted for socio-demographic characteristics and showed that predictors of knowledge variable were associated with having prior experience of breastfeeding another infant ($P=0.006$) and encouraging others to breastfeed ($P=0.008$); also, the predictor of attitude variable was aligned with encouraging others to breastfeed ($P<0.001$).

Conclusion: The findings of this study affirm that knowledge and attitude of healthcare providers were moderately influential for breast milk donation. Since they could play a responsible role in providing education, positive atmosphere for specialized training for the general public, the efforts to improve their knowledge and attitudes can contribute to acceptability of a milk-bank in the community and reduction of the rate of neonatal mortality in Iran.

Keywords: Attitudes, Health care provider, Knowledge, Milk bank, Milk sharing

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INTRODUCTION

Breast milk is the best nutritional source for infants in order to have a complex combination of proteins, antibodies, vitamins, growth factors, hormones, cytokines, and several immune factors.¹ Breastfeeding is beneficial to both mothers and infants by boosting their immune system, balancing endocrine pathways, elevating metabolism, improving nerve growth, and reducing allergies and obesity.² The risk of hospitalization due to upper and lower respiratory tract infections in the first year of life is dramatically reduced by 72% for infants who are exclusively breastfed for more than 4 months.³ Based on the latest statistics of the World Health Organization (WHO), the rate of exclusive breastfeeding in the infants under 6 months is 44% in Asia and 53.1% in Iran.⁴ Breastfeeding has reduced annual global infant morbidity and mortality by approximately 823,000 deaths under the age of 5.⁵ Formula-fed infants are nearly fifteen times more likely to die from pneumonia than breastfed ones.⁶ Breastfeeding reduces the risk of acute otitis media in infants by 23%.⁷ A 30% reduction in the incidence of type I diabetes has been reported in infants who have been exclusively breastfed for at least 3 months.⁸

The WHO and the American Academy of Pediatrics recommend exclusive breastfeeding for the first six months of an infant's life,^{7,9,10} and donated milk can be used in infants who have no access to breast milk.¹¹ Sharing of breast milk is not a new concept. It has been documented that informal sharing of breast milk was common since the 19th century.⁵ Pasteurized Donor Human Milk Banking (PDHMB) is an institution that collects and processes breast milk based on physicians' prescription and subsequently distributes it among the screened and qualified infants. The PDHMB aims to reduce the overall neonatal mortality rate and prevent global childhood malnutrition by protecting, promoting, and supporting exclusive breastfeeding when mothers' milk is unavailable.¹² The first Human Milk Banking (HMB) was established

by a midwife in Vienna, Austria, in 1909 and shortly thereafter in Boston, USA, as a replacement for newborns. The number of HMB is constantly increasing in the world and is expanded from less than 10 banks in 1979 to 700 HMBs in 66 countries by 2020.^{13, 14} There are currently 210 milk banks in Europe, and Brazil alone has 210 milk banks. In Iran, Milk Bank is a new concept and the first breast milk bank was launched in 2016 in Al-Zahra Teaching Maternity Hospital, affiliated with Tabriz University of Medical Sciences with the financial support of the ministry of health.^{15, 16} Since then, 10 breast milk banks have been set up in the country, two of which are located in Tehran, and others in Mashhad, Zahedan, Ahvaz, Kermanshah, Kerman, and Shiraz.¹⁶

Several studies have suggested that establishment of Milk Bank is associated with an increase in exclusive breastfeeding rate and increased awareness of families and employees about the value of breastfeeding.^{17, 18} HMB ensures that donated human milk is safe and healthy without contamination or pathogenicity. The necessary criteria for donating milk in Iran include being a Muslim; having good moral/ethical values; being in good physical and mental health; having given birth within the last 12 months, being willing to perform the required blood tests with no history of HIV, hepatitis B, hepatitis C, tattoos or organ transplants; and having no history of drug use, addiction or smoking, and no regular use of incompatible medications.¹⁵

Those with very low birth weight infants, having no breast milk in the first few days after birth, multiple gestations, mothers with inverted or injured nipples or taking certain medications, infants with malformations prohibiting latching or those with necrotizing enterocolitis, etc., would qualify to receive donated breast milk.¹² In countries where HMB has been successfully established, the key role of the healthcare providers is to ensure the acceptance and use of the Milk Bank as an important resource.¹⁷ Given that most mothers relied on health workers for

information on donor human milk and breast milk feeding, it is important for health workers to have adequate knowledge on the subject.¹⁹ Health care providers can encourage mothers to donate milk by providing vital information about the importance and the effects of donated milk on the infants who cannot receive breast milk from their mothers.¹⁸

Review of literature indicated that providing education and motivation by healthcare providers has a major influence on infant feeding choice.^{17, 19} Some published studies suggest that many health workers are not well informed about breast milk donation and that conflicting advice from health care provider can deter the use of HMB.^{18, 20} Given that the success or failure of HMB and acceptance of donated milk depend on the healthcare team's knowledge and attitude,²¹ understanding the knowledge and attitudes of healthcare providers working with mothers can provide valuable information for future development and policy-making on milk donation.^{20, 21} In Iran, limited data exists on how healthcare providers perceive the practice of HMB. Therefore, this study aimed to evaluate the knowledge and attitude of Iranian healthcare providers regarding milk bank and donated milk based on their socio-demographic predictors in two teaching maternal hospitals and several health centers in Tabriz-Iran.

METHODS

In a cross-sectional analytical study, researchers obtained data from October 2020 to February 2021 in Tabriz, Iran. The sample size was determined using the primary data obtained from the study by Shoghi et al.²⁰ (Mean=11.37, SD=2.8, $z=1.96$, $d=0.05$) which was done on 97 participants; regarding the limited research society members, we used census sampling method and selected 535 participants.

$$n = \frac{\left(z_{1-\frac{\alpha}{2}}\right)^2 * \delta^2}{(d)^2}$$

Among this sample size, 272 were

eligible nurses and midwives from Alzahra and Taleghani hospitals which are the only two maternity teaching hospitals in Tabriz and provide the mothers and infants with preventive and therapeutic services; 263 of them were eligible primary healthcare providers (bachelor of midwifery and public health), from 57 primary healthcare centers (57 among 60 healthcare centers in Tabriz). The inclusion criteria consisted of having at least an associate degree, being involved in direct care of mothers or infants in selected hospital, and agreeing to voluntarily participate in this study; the questionnaires which had more than 20% of missing items were excluded from the study.

Census sampling method was used to recruit primary healthcare providers from a list of urban primary healthcare centers according to the specialties and locations of the centers. Researchers contacted each healthcare facility and two maternity teaching hospitals for their suitability and permission to start the sampling process using the inclusion and exclusion criteria. Nurses and midwives who were working in the neonatal intensive care unit (NICU), neonatal unit, labor and delivery (L&D), postpartum unit, high-risk pregnancy wards and intensive care unit (which only admit complicated mothers during pregnancy and postpartum period) at Al-Zahra and Taleghan teaching hospitals were recruited. Since the majority of participants worked at different shifts, researchers had to follow their schedule for recruitment and data collection. Selected and qualified participants were given detailed explanation on the study purpose, voluntary participation, and offered a written informed consent to obtain signature before presenting the study self-reporting questionnaires to be completed. After administering the questionnaires, those with 20% unanswered questions were excluded, and the final 535 completed questionnaires were analyzed.

To collect information, a 3-part questionnaire was used; it included socio-demographic information questionnaire,

knowledge questionnaire and attitude assessment questionnaire.

Socio-demographic information checklist had 21 items including age, educational level, employment history, type of employment, marital status, number of children and their ages, spouse age, spouse's educational level, spouse's job, income status, type of delivery, prenatal education on infant nutrition, history of using donated breast milk, experience with breastfeeding another mother's child, child hospitalization after birth, encouraging others to breastfeed, knowing the person who donated the milk, receiving milk from milk bank, and hearing about milk bank and their source of information.

A knowledge assessment questionnaire with 22 items and an attitude assessment questionnaire with 42 items focusing on milk bank, breast milk donation, and the use of donated milk, which was developed by reviewing the literature^{13, 14, 17, 19, 20} was used. The knowledge questionnaire had a three option scale of "yes", "no", "and I do not know" for each question. The "yes" option was given 1 score, the "no" option and "I do not know" options had zero score. The total score of knowledge assessment ranged from 0 to 22, with higher scores indicating higher levels of knowledge about the research topic. The attitude questionnaire was assessed on a 5-point Likert scale (from strongly agree to strongly disagree). The range of scores obtained was between 42 and 210 and a higher score indicated a more positive attitude towards the research topic.

The face and content validities of the questionnaires were determined by both quantitative and qualitative methods. For this purpose, the questionnaires were distributed among 10 professors at Tabriz University of Medical Sciences and based on their feedbacks, necessary corrections were made. Also, for the quantitative content validity, content validity ratio (CVR) and content validity index (CVI) were determined. According to the Lawshe table, expert views in this study (10 people) were considered, CVR above 0.62

was acceptable, and CVI above 0.79 was also considered acceptable.²² The CVR for the knowledge questionnaire was 0.88 and for the attitude questionnaire was 0.91. The CVI was 0.91 for the knowledge questionnaire and 0.94 for the attitude questionnaire. Exploratory factor analysis (EFA) was used to assess the construct validity. Bartlett's test, the Kaiser-Meyer-Olkin (KMO) index, scree plots, and Oblimin rotation were used in EFA. As to the attitude questionnaire, the KMO index was 0.912, and Bartlett's test was 10718.32 at the significance level of $P < 0.001$; As for knowledge questionnaire, the KMO index was 0.831, and Bartlett's test was 2412.29 at the significance level of $P < 0.001$, which justified the factor analysis according to the correlation matrix obtained from the study samples. Factor loadings obtained for all items in both questionnaires were larger than 0.3. Internal consistency reliability was used to determine the reliability of the tool. Cronbach's alpha coefficient was found to be 0.86 and 0.90 for knowledge and attitude questionnaires, respectively.

Data were analyzed using SPSS-Version 16 software. The normality of quantitative data was assessed using Skewness and Kurtosis, which had a normal distribution. Descriptive statistics of frequency (percentage) and mean (standard deviation) described socio-demographic characteristics and the variables of knowledge and attitude. Pearson correlation test determined the correlation between knowledge and attitude variables. The Pearson correlation, independent t-test and one-way analysis of variance (ANOVA) were used to determine the association of knowledge and attitude with socio-demographic characteristics. The independent variables with a p-value of less than 0.05 in bivariate tests were entered into the general linear model to control the confounding variables and determine the effect of each independent variable (socio-demographic variables) on the dependent variables (knowledge or attitude). $P < 0.05$ was considered as significant.

The present study was approved by the

Ethics Committee of Tabriz University of Medical Sciences with the code of [IR.TBZMED.REC.1399.399] for researchers to observe the ethical principles of research by explaining the research objectives to the participants, ensuring data confidentiality and voluntary engagement in the study. Participants read and signed an informed written consent and the research method followed the Helsinki Declaration.

RESULTS

The total participants were 535 including 274 (51.2%) nurses and midwives working at two teaching maternity hospitals and 261 (48.8%) healthcare providers working at

different primary healthcare centers. All the participants were female. The majority of the participants (460;85.9%) had received training on infant nutrition, specifically on the topic of breastfeeding. Only 94 (17.6%) participants had given donated human milk to their infants. Of those, 36 (6.8%) received milk from the milk bank and 58 (10.8%) were breastfed with another mother's infant. Most of the participants (390;73%) had encouraged other mothers to donate their excess breast milk. Demographic characteristics of the participants are listed in Table 1.

The mean (SD: standard deviation) of the knowledge score was 12.04 ± 4.30 from the score range of 0-22 and that of the attitude score was 134.27 ± 20.23 from the score

Table 1: Socio-demographic characteristics and their association with the knowledge and attitude of participants as to donating milk (n=535)

Variable	N (%)	Association with attitude		Association with knowledge	
		Attitude Mean $\pm$ SD	P value	Knowledge Mean $\pm$ SD	P value
Education			0.583*		<0.001*
Associate degree	43 (8.1)	129.67 $\pm$ 15.46		10.81 $\pm$ 4.38	
Bachelor	447 (83.5)	134.86 $\pm$ 20.55		12.09 $\pm$ 4.22	
Master	45 (8.4)	131.97 $\pm$ 20.53		12.52 $\pm$ 4.76	
Work experience (Year)			*0.771		*0.003
<5	128 (23.9)	135.16 $\pm$ 19.62		10.98 $\pm$ 3.96	
5-9	159 (29.7)	132.71 $\pm$ 19.88		12.01 $\pm$ 4.25	
10-14	80 (15.1)	134.48 $\pm$ 20.37		12.92 $\pm$ 4.23	
15-19	85 (15.8)	136.00 $\pm$ 21.06		13.03 $\pm$ 4.24	
≥ 20 years	83 (15.5)	133.98 $\pm$ 20.92		12.14 $\pm$ 4.57	
Employment type			*0.003		*0.006
Project	83 (15.5)	138.18 $\pm$ 19.18		11.13 $\pm$ 4.01	
Contractual	189 (35.3)	130.05 $\pm$ 19.11		11.54 $\pm$ 4.32	
Temporary	51 (9.5)	137.58 $\pm$ 19.55		12.29 $\pm$ 3.96	
Formal	212 (39.7)	135.65 $\pm$ 21.22		12.76 $\pm$ 4.38	
Workplace			<0.001*		<0.001*
Neonatal unit	45 (8.4)	144.64 $\pm$ 19.50		13.88 $\pm$ 3.80	
NICU ^a	81 (15.1)	144.35 $\pm$ 15.60		13.39 $\pm$ 3.65	
ICU ^b	23 (4.3)	140.38 $\pm$ 16.94		12.80 $\pm$ 2.90	
HCU ^c	12 (2.2)	140.08 $\pm$ 26.01		9.25 $\pm$ 5.1	
High-risk pregnancy	13 (2.3)	131.76 $\pm$ 24.40		9.46 $\pm$ 3.64	
Maternal	44 (8.3)	130.70 $\pm$ 17.49		11.59 $\pm$ 4.43	
Obstetrics	56 (10.6)	130.46 $\pm$ 19.12		11.75 $\pm$ 3.72	
Health	261 (48.8)	130.13 $\pm$ 20.48		11.62 $\pm$ 4.55	
Marital status			0.166*		0.810*
Single	123 (23)	137.26 $\pm$ 18.56		11.84 $\pm$ 4.07	
Married	399 (74.6)	133.31 $\pm$ 20.62		12.09 $\pm$ 4.37	
Divorced or widowed	13 (2.4)	135.87 $\pm$ 21.34		12.37 $\pm$ 4.42	
Spouse education			<0.001*		<0.001*

Diploma and under	39 (9.8)	135.32±20.89		11.85±4.07
Associate	40 (10)	131.37±22.10		10.50±4.31
Bachelor	185 (46.3)	134.69±19.51		12.17±4.54
Master	100 (25)	133.04±20.56		12.85±3.95
PhD	35 (8.9)	134.12±18.56		
Spouse occupation			0.566*	* 0.062
Unemployed	11 (2.8)	120±24.95		10.45±3.61
Employed	243 (61.3)	134.19±19.54		12.02±4.25
Worker	11 (2.8)	129.27±15.03		13.18±4.46
Self-employed	114 (28.8)	132.10±22.44		12.18±4.61
Others (retired and ...)	17 (4.3)	142.17±18.98		12.94±5.15
Income status			0.008 *	0.003*
Expenditure less than earnings	58 (10.9)	138.94±19.98		12.90±4.26
Expenditure equal earnings	297 (55.5)	19.70±135.60		12.41±4.25
Expenditure more than earnings	180 (33.6)	130.69±20.86		11.16±4.23
Age	36.49±7.93 **		0.819 ***	0.013 ***
Last child age	8.52±5.61 **		0.725***	0.624***
Spouse age	41.24±8.12 **		0.918***	0.172 ***
Delivery type			0.438****	0.087****
Normal	31 (9.9)	131.70±19.02		11.58±3.60
Cesarean section	282 (90.1)	20.43 134.09±		12.30±4.35
Number of children			0.662 *	0.491 *
1	175 (56.1)	132.63±20.94		11.90±4.36
2	128 (41)	135.15 (19.44)		12.82±4.17
3	9 (2.9)	134.45 (19.32)		12.76±4.23
Gender of last child			0.143****	0.758****
Male	173 (55.8)	135.18±19.15		12.38±4.28
Female	137 (44.2)	131.78±21.52		12.33±4.26
Child hospitalization after birth			0.456****	0.009****
Yes	54 (17.5)	134.94±19.08		12.16±3.49
No	255 (82.5)	133.38±20.54		12.34±4.44
In-service training			0.692****	0.360****
Yes	460 (85.9)	134.67±20.06		12.40±4.14
No	75 (14.1)	133.24±21.12		10.01±4.75
Milk donation to another infant			0.38****	0.006****
Yes	58 (10.8)	140.45±18.43		14.15±3.14
No	272 (89.2)	133.06±20.48		12.01±4.26
Encouraging others to donate milk			<0.001****	<0.001****
Yes	383 (71.6)	138.96±18.66		12.89±4.06
No	142 (26.5)	123.02±19.16		9.88±4.18
Knowing a human milk donor			<0.001****	<0.001****
Yes	243 (45.9)	138.48±19.52		13.16±3.94
No	286 (54.1)	130.84±19.92		11.12±4.38
Hearing about milk donation			0.025****	0.065****
Yes	479 (90)	135.01±20.08		12.39±4.13
No	53 (10)	128.47±20.23		8.83±4.58

*One way ANOVA; **Mean (Standard Deviation); ***Pearson correlation test; ****Independent t-test;

^aNeonatal intensive care unit; ^bintensive care unit; ^chigh dependency unit

range of 42-210. Among the items related to knowledge, the highest frequency of favorable answer (427;79.8%) was related to the item stating “Donor human milk contains more nutrients than infant formula”, and the item with the least favorable response (170; 31.8%) was the item stating “Donated milk may transmit the disease to the breastfed child”.

On the attitude survey, the item stating “I agree to donate milk because it is an altruistic and humanitarian act” had the most agree and strongly agree response (393;73.4%) and the item with the least agree or strongly disagree response (36;6.7%) was “I prefer to accept breast milk donated from strangers”. The results of Pearson correlation test showed a significant positive correlation between knowledge and attitude ($r=0.44$, $P<0.001$).

The results of bivariate tests (independent

t-test, one-way ANOVA and Pearson correlation) showed that knowledge score was significantly associated with the education level variable ($P<0.001$), workplace ($P<0.001$), employment status ($P=0.006$), work experience ($P=0.003$), income level ($P=0.003$), spouse education ($P<0.001$), age ($P=0.013$), experience of breastfeeding of another infant ($P=0.006$), encouraging others to donate milk ($P<0.001$), child hospitalization after birth ($P=0.009$) and knowing another person as a milk donor ($P<0.001$). Also, there was a significant association between the attitude score and variables such as workplace ($P<0.001$), spouse education ($P<0.001$), employment status ($P=0.003$), income level ($P=0.008$), knowing another person as a milk donor ($P<0.001$), hearing about milk donation ($P=0.025$), and encouraging others to donate milk ($P<0.001$) (Table 1).

Table 2: Socio-demographic predictors of knowledge about donating milk (n=535)

Variable	B (95% Confidence Interval)	P-value*
Education (Reference: Master)		
Associate degree	0.10 (-2.39 to 2.60)	0.935
Bachelor	0.36 (-1.68 to 2.42)	0.725
Ward Type (Reference: HDU ^a)		
Obstetrics	2.42 (-2.28 to 7.13)	0.322
ICU ^b	2.53 (-2.25 to 7.31)	0.298
NICU ^c	3.23 (-1.26 to 7.72)	0.158
HR ^d	0.56 (-5.67 to 6.80)	0.858
Pediatrics	2.35 (-2.32 to 7.03)	0.322
Gynecology	1.47 (-3.23 to 6.18)	0.538
Health	1.35 (-3.09 to 5.81)	0.549
Type of employment (Reference: Formal)		
Project	-0.81 (-3.59 to 1.96)	0.565
Contractual	-0.61 (-1.91 to 0.68)	0.353
Temporary	-0.34 (-2.04 to 1.34)	0.685
Income (Reference: earnings less than expenditures)		
Expenditure > earnings	1.70 (-0.01 to 3.42)	0.052
Expenditure=earnings	0.73 (-0.33 to 1.81)	0.175
Age	0.49 (-0.03 to 0.12)	0.224
Hearing about milk donation (Reference: No)		
Yes	1.57 (-0.12 to 3.28)	0.070
Experience of breastfeeding another infant (Reference: No)		
Yes	1.72 (0.24 to 3.20)	0.006
Encouraging others to donate milk (Reference: No)		
Yes	1.64 (0.43 to 2.84)	0.008
Knowing another person as a milk donor (Reference: No)		
Yes	0.78 (-0.24 to 1.80)	0.134

^ahigh dependency unit; ^bIntensive care unit; ^cNeonatal intensive care unit; ^d high risk pregnancy; *Adjusted general linear model

The variables with a statistically significant association with the knowledge and attitude score as independent variables and the knowledge and attitude score as a dependent variable were entered into the adjusted general linear model. The results of the general linear model was adjusted for socio-demographic characteristics, showing that the variables of breastfeeding another infant and encouraging others to breastfeed were the predictors of knowledge variable. Knowledge score was significantly higher among the participants who breastfed an infant other than their own compared to those who did not have that experience ($B=1.72$; 95% confidence interval (95% CI): 0.24 to 3.20; $P=0.022$), and it was significantly higher for those who encouraged others to use donated milk ($B=1.64$; 95% CI: 0.43 to 2.84%; $P=0.008$) (Table 2).

Regarding the attitude variable, the results revealed that encouraging others to donate milk was a predictive variable for attitude, and encouraging others to use donated milk ($B=12.27$; 95% CI: 6.69 to 17.85; $P<0.001$) showed a significantly higher score for attitude (Table 3).

DISCUSSION

The present study aimed to evaluate the knowledge and attitude of healthcare providers of teaching maternity hospitals and primary healthcare centers in Tabriz, Iran, and focused on finding the predictors towards establishing milk bank and promoting milk donation according to the participants' socio-demographic profiles.

Findings showed that despite the novelty of breast milk donation concept, healthcare providers were moderately informed about breastfeeding and milk bank. Findings of similar studies in India showed that 64% of nursing students²³ and 66% of nurses working in the obstetric and pediatric wards²⁴ had good knowledge about milk banking, which is somehow in line with our findings. In a recent study, mothers reported that appropriate training by health care professionals would increase their confidence in the donation and more adherence to breastfeeding and breast milk donation, and generally leads to the success of the establishment of breast milk bank.²¹ Given that healthcare professionals would be responsible for monitoring the breast

Table 3: Socio-demographic predictors of attitudes about donating milk (n=535)

Variable	B (95% Confidence Interval)	P-value*
Workplace(reference: HDU ^a)		
Obstetrics	-18.84 (-37.95 to 0.25)	0.053
ICU ^b	-1.04 (-20.89 to 18.80)	0.918
NICU ^c	-6.68 (-24.60 to 11.24)	0.464
High risk pregnancy	-6.17 (-34.15 to 21.81)	0.664
Pediatrics	-6.31 (-25.23 to 12.61)	0.512
Gynecology	-13.18 (-32.17 to 5.79)	0.172
Health	-13.67 (-31.24 to 3.88)	0.126
Type of employment (Reference: official)		
Project	-6.41(-18.66 to 5.84)	0.304
Contractual	-3.70 (-9.04 to 1.63)	0.173
Treaty	-0.16 (-8.15 to 7.81)	0.967
Income (Reference: Expenditure < earnings)		
Earnings more than expenditures	7.15 (-1.42 to 15.73)	0.102
earnings equal to expenditures	-0.25 (-5.30 to 4.79)	0.921
Knowing another person as a milk donor (Reference: No)		
Yes	1.82 (-3.05 to 6.69)	0.463
Hearing about milk donation (Reference: No)		
Yes	-0.38 (-8.59 to 7.82)	0.926
Encouraging others to donate milk (Reference: No)		
Yes	12.27 (6.69 to 17.85)	<0.001

^aHigh dependency unit; ^bIntensive care unit; ^cNeonatal intensive care unit; *adjusted general linear model

milk bank, their knowledge and attitude toward the subject can greatly influence the public behavior. Nurses greatly influence the breastfeeding mothers' initiation and duration of breastfeeding, and thus their initiation to donate breast milk and establish breast milk bank,²³ so it is necessary to highlight that the healthcare professionals should receive enough knowledge or training in breastfeeding as well as about breast milk donation and breast milk bank establishment.

In our study, only 10% of healthcare providers had no information about donating milk and milk bank. In a similar study in Korea, 50% of healthcare providers did not have any information about human milk bank.²⁵ Results of another study in Ethiopia showed that more than half of healthcare providers had no information about donating milk.²⁶ In Zimbabwe, only 58% of healthcare staff knew about milk bank.¹⁷ In this study, the main reason for healthcare providers' more knowledgeable and positive attitude towards breast milk donation and milk bank could be attributed to the fact that participants from two specialized maternity teaching hospitals and healthcare centers were actively involved and familiar with the research topic. It is obvious that breastfeeding mothers can receive more information about breastfeeding and breast milk donation after the healthcare professionals enriched their own knowledge.

In this study, 73% of healthcare providers encouraged others to donate milk. Most of the mothers in communities where the HMB is a new concept need strong encouragement for using donated milk.²⁷ Encouragement to donate breast milk provided by primary healthcare unit professionals was shown to be important for the practice of human milk donation.²⁸ The most commonly reported reasons for donating milk by mothers in a study carried out in Brazil was encouragement of a healthcare professionals.²⁹ In another study, some breastfeeding mothers reported that they received negative feedback and discouragement from healthcare professionals, which served as an obstacle to the success of

establishing breast milk bank.²¹ Researchers in Zimbabwe found that 56% of healthcare providers encouraged breast milk donation.¹⁷ Higher rates in our study could be related to the excitement of establishing a Milk Bank and thus support for milk donation in Tabriz, Iran. Almost half of the healthcare providers stated that they would accept donated milk to feed their infant. Those unwilling to accept donated milk provided guidance to enhance staff education and promote their trust in the safety of the mentioned measure.

According to a study conducted in 2020 on knowledge domain items, 77% of nurses responded positively when they were asked if "Donated human milk contains more nutrients than formula",²⁰ which supported our findings. In other similar studies, the majority of health workers state that donated milk is safe and the first-line option when for a variety of reasons breast milk is not available.^{28, 30} In similar studies in Canada and Australia, 91.2% and 78.8% of health practitioners agreed that donated milk was the first line alternative when the mothers breast milk was not available.^{30, 31} Regarding transmission of diseases through breastfeeding, in a recent study conducted in Kenya, researchers found that fear of disease transmission is among the three most important reasons for not using donated milk.³² In Ethiopia, researchers reported that fear of disease transmission through donated milk posed a major concern for healthcare providers.²⁶ In Korea, 76% of healthcare providers reported no willingness to use donated milk and the main reason was fear of infection transmission.²⁵ In Australia, 8.4% believed that donated milk carried infection.³² Also, in Zimbabwe, with a high prevalence of HIV, acceptance of donated breast milk was identified as a major barrier for health providers.¹⁷ These results support findings of this study and show that safety concern is a barrier for promotion of donated milk. Knowledge deficit and unfamiliarity with the process of donor selection, pasteurization of the donated milk, storage and distribution process, and close monitoring

of the milk bank inventory contribute to fear and safety concerns regarding donated milk among the healthcare staff and general public.

The attitude variable item which generated the most “agree” response was “I agree to donate milk because it is an altruistic and humanitarian act”. In a recent study, 80% of the staff reported that their willingness to donate milk stemmed from the desire to help infants who needed breast milk.¹⁷ In another study, it is reported that concepts such as altruism and a general desire to help others are one of the main reasons of milk donation.³³ The item receiving the lowest “agree” response (6.7%) was “I prefer to accept donated breast milk from strangers”. In a study conducted in Iran, about 76% of nurses were unwilling to receive breast milk from strangers and stated that they would accept donated milk if the donor was a close relative.²⁰ These findings support our study results and are similar to the reason given for not accepting donated milk from strangers in a study by Shoghi, where nurses had fear and concerns about the disease or abnormal genetic characteristics transmission through breast milk and found cultural and religious barriers. Therefore, we need to address religious and cultural beliefs of women and families regarding milk donation and the use of donated milk. Moreover, the healthcare professionals should be well-equipped about the milk donation and have a positive attitude towards them, in order to educate the mothers and encourage them to comply to breastfeeding and breast milk donation. The positive and encouraging attitude of healthcare professionals is essential for the recruitment of breastfeeding mothers to donate their breast milk and contribute to a potential breast milk bank.²¹

In this study, we found that the variable of encouraging others to breastfeed was a predictor of both knowledge and attitude. The results of another study also showed that encouraging mothers to use donated milk was significantly and positively associated with their increased knowledge and attitude about the milk bank and milk donation, especially

when the healthcare staff were more knowledgeable and exhibited enthusiasm towards milk bank leading to promotion of milk donation and the use of donated milk.¹⁷

In a recent study, nurses who had positive attitudes regarding donor milk, despite misconceptions on its safety, encouraged mothers to use donated milk.²⁶ Having an experience with breastfeeding another infant was also a predictor of knowledge. In a recent study, the healthcare staff who had no experience with donating milk and/or using donated milk showed lack of knowledge and less favorable attitude towards donating milk, compared to those with prior experiences in donating milk and/or using donated milk.²⁰

This study had some limitations including the lack of standard tools to assess knowledge and attitudes of healthcare providers. To overcome this limitation, the face and content validity and reliability of the tools used were measured using quantitative and qualitative methods. The researchers could not assess criterion-related validity due to the lack of standard tools, which is the other limitation of the study. Sampling from just two maternity hospitals is another limitation of our study which can affect the generalizability of the findings. Another limitation was related to the use of cross-sectional method to show the correlation between knowledge and attitude, between some socio-demographic characteristics, and knowledge and attitude, which may not accurately identify the cause and effect relationships. Sampling from all health centers in Tabriz is one of the strengths of this study. It is suggested that a qualitative study or mixed method should be conducted to gain a deeper understanding of the nurses and healthcare providers’ perceptions about milk donation.

CONCLUSION

Findings showed that the knowledge level and attitude of nurses, midwives, and healthcare providers about breast milk donation was moderate. Since healthcare providers were

influential in promoting milk donation, were engaged in breastfeeding counseling, and could encourage the mothers to receive donated milk, they held a responsible role in providing education and positive atmosphere for specialized training, not only for the healthcare team, but also for the general public; Thus, efforts to improve their knowledge and attitudes can contribute to acceptability of a milk-bank in the community and reduce the health cost and finally the rate of neonatal mortality in Iran.

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