

Human Milk Donation in Northern Italy: Barriers, Facilitators and Information Sources

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Abstract—Background: Breastfeeding represents the gold standard for term and preterm infants. When mother's milk is insufficient, the best alternative is donor human milk, especially for preterm and high-risk infants. In Italy, there are 33 human milk banks, but collected milk is still insufficient to meet the need.

Research aim: The research aimed at exploring women's knowledge and attitudes towards milk banks and identifying factors influencing or encouraging mothers to donate milk.

Methods: In this mixed-methods study, we administered a questionnaire to 153 women admitted to an Italian obstetric hospital. Subsequently, we interviewed 7 human milk donors and 10 mothers who utilized donor milk to feed their infants.

Results: Almost all participants intend to breastfeed and know at least one of the benefits of human milk. Only 55,6% of respondents know the importance of donor human milk to feed preterm and sick infants. 71,2% is aware that milk can be donated, but only 7,2% knows how. 63,4% would like to obtain more information about milk donation. 56,9% is interested in becoming donor and 45,1% would use donor human milk.

Human milk donors state that the procedure is easy, quick and gratifying. Reasons for donation include "helping other babies" and "avoiding waste". Human milk users prove thankful and stress the importance of donor milk in preventing diseases.

Conclusions: A certain lack of knowledge about human milk banks and donation emerges. Women would like to receive better information. The experience of donating and using human milk was described as positive by all the participants.

Index Terms—Human milk, Milk bank, Breastfeeding, Italy.

I. BACKGROUND

Human milk confers important nutritional, immunological and economic benefits for both infants and mothers, and these benefits are widely recognized [1]-[6]. Mother's own milk is the feeding of choice for term and preterm infants, and every effort should be made to encourage lactation. However, when mother's milk is not available or is insufficient, donor human

milk (DHM) becomes essential.

DHM is important especially for the nutrition of those preterm and sick infants who are hospitalized in Neonatal Intensive Care Units (NICUs). In fact, it decreases the rate of necrotizing enterocolitis, infections, bronchopulmonary dysplasia and metabolic syndromes, increases food tolerance and improves long-term cardiovascular and neurocognitive outcomes [7]-[11].

For these reasons, human milk banks (HMBs) have been established, providing a service designed to select donors and collect, manage, process, store and distribute DHM through procedures that ensure high safety standards [10]-[12].

Currently in Italy there are 33 HMBs, quite a large number when compared to that of other European nations [26], but both in Italy and in Europe the volume of collected milk is insufficient to feed all the infants who need it [12], [13]. Therefore, it seems important to identify and implement some strategies to promote human milk donation, thus increasing the amount of collected milk [12].

To date, the topic of human milk donation has mainly been investigated from the clinical and nutritional point of view [3], [7], [8]-[10]. Only few studies focused on social, anthropological and psychological perspectives, describing the socio-demographic profile of milk donors and the possible reasons behind their choice of donating milk [14]-[19]. Furthermore, there is a lack of information about the Italian and European context, as most studies concern the US, Australia and Brazil [20]-[23].

Therefore, our research aims to understand the knowledge of human milk donation and HMBs by potential donors and to identify the main facilitators and barriers affecting donation, analyzing the experiences of human milk donors (HMDs) and human milk users (HMUs).

II. METHODS

The project was approved by the Bioethics Committee of the University of Turin.

Data gathering involved 2 different kinds of methods: a quantitative research and a qualitative research.

A. Quantitative research

A questionnaire was administered to 153 women admitted to Sant'Anna Hospital in Turin (Italy) from 1st of June to 31st of July, 2014. The questionnaire was written in Italian and made up of 14 multiple-choice questions and 2 short open questions. It took approximately 10 minutes to complete it.

The sample was selected according to the following inclusion criteria: pregnant women, irrespective of gestational age; mothers who had vaginal delivery; mothers

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who had Caesarean section. We excluded women who suffered from any infections or chronic diseases which represent an absolute contraindication to breastfeed and those taking drugs because of which breastfeeding was not recommended.

The midwives in charge of the Obstetric Units informed the patients about the purpose of the study, invited them to fill out the questionnaire and, in case of agreement, gave them the form to be filled.

Among the 173 selected women, 153 choose to subscribe the study; the remaining 20 women (11,56%) did not join the research. This opportunity sample included all women admitted to the hospital in the time frame of the study, meeting the inclusion criteria.

Data were collected from 1st of June to 31st of July, 2014, and were statistically analysed, including frequencies measures and percentages, throughout an Electronic Spreadsheet Program (Microsoft Excel).

B. Qualitative research

The principal investigator conducted semi-structured interviews with 7 HMDs and 10 HMUs.

Participants' recruitment ended when saturation was reached, i.e. the sample was large enough to assure that all the significant perceptions were disclosed and the collection of new data would not shed any further light on the issue under investigation [24].

To recruit HMDs, Regina Margherita's Milk Bank staff (in Turin) contacted 10 women who had recently finished donating milk or who were still donating and asked for their willingness to join the research. We included both women with previous experience as HMDs and first-time donors. Out of 10, 7 women agreed to participate: 6 of them preferred a telephone interview, while 1 woman chose a face-to-face interview in Sant'Anna Hospital NICU, where her baby was admitted. In both cases, interruptions and distractions during the interview were avoided.

For the recruitment of HMUs, the healthcare professionals of Sant'Anna Hospital contacted 10 mothers whose infants were admitted to Sant'Anna Hospital's NICU. All of them gave the informed consent to the use of DHM for feeding their preterm infants after birth and to join the study. The face-to-face interview took place in a quiet space close to the NICU.

The trace of the interview, which required wide-open answers, was followed in a flexible way supporting women's flow of thoughts and trying to interfere as little as possible with their speech. In addition, we asked for socio-demographic information (age, nationality, educational level, occupation, number of children).

The interviews were conducted in Italian, had an average duration of 15 minutes and were recorded. Then, they were verbatim transcribed. After reading them thoroughly, the transcripts were analysed and categorized based on the principles of thematic analysis [25]. Some excerpts from women's answers were selected as quotations. Data were collected from July to September 2014.

III. RESULTS

A. Questionnaires

153 participants completed the questionnaire. In the first part of the questionnaire, we asked the women some personal data, such as age, nationality, language, educational level, occupation and religion (Table 1).

Most of the respondents were Italian (74.5%; n = 114), Catholic, employed and with a medium-high level of education.

Socio-demographic data obtained from the selected sample were compared with those of the women admitted at the Obstetrics Units of Sant'Anna Hospital in the year 2014. All the compared variables, like age, nationality, educational level and occupation were similar.

Table 1. Socio-demographic Characteristics of the Sample

Characteristic	n (%)
Age, y	
18-25	18 (11.8)
26-30	31 (20.3)
31-35	49 (32.0)
36-40	44 (28.8)
>40	10 (6.5)
Missing values	1 (0.7)
Nationality	
Italian	114 (74.5)
Romanian	19 (12.4)
Albanian	4 (2.6)
Moroccan	3 (2.0)
Chinese	2 (1.3)
Russian	2 (1.3)
Moldavian	2 (1.3)
Peruvian	2 (1.3)
Other	5 (3.3)
Language	
Italian	114 (74.5)
Romanian	19 (12.4)
Arabic	4 (2.6)
Albanian	4 (2.6)
Spanish	3 (2.0)
Chinese	2 (1.3)
Russian	2 (1.3)
Moldavian	2 (1.3)
Other	3 (2.0)
Educational level	
Elementary school	1 (0.7)
Middle school	27 (17.6)
High school	72 (47.1)
University education	50 (32.7)
Missing values	3 (2.0)
Occupation	

Employed	130 (85.0)
Unemployed	10 (6.5)
Student	2 (1.3)
Missing values	11 (7.2)
Religion	
Catholic	108 (70.6)
Orthodox	16 (10.5)
Muslim	4 (2.6)
Buddhist	1 (0.7)
Atheist	14 (9.2)
Missing values	10 (6.5)

Women's knowledge about the benefits of breastfeeding can be considered very satisfactory, since all respondents stated that they knew at least one of the breast milk's advantages vs formula feeding.

Almost the whole sample (98.7%) would have liked to breastfeed and only the remaining 1.3% was not determined to do it, although 100% of the respondents was aware of the benefits deriving from breastfeeding (Table 2).

The means by which women learned about the importance of breastfeeding were mainly books, magazines, internet and mass media (63.4%; n = 97), followed by information obtained during the courses held by midwives during pregnancy (32, 7%; n = 50).

Table 2. Participants' Knowledge about Benefits deriving from Breastfeeding

Benefits of breastfeeding	n (%)
Nutritional benefits	136 (88.9)
Protection against infections	117 (76.5)
Better neuro-cognitive development	76 (49.7)
Better short-term and long-term outcomes	105 (68.6)
Other (Protection against breast and ovary cancer, earlier maternal physical recovery, prevention of Sudden Infant Death, better mother-infant bonding)	17 (11.1)
Missing values	3 (2.0)

Table 3. Participant's Knowledge about Human Milk Banks

Do you know Human Milk Banks?	n (%)
No	55 (35.9)
Yes, from...	98 (64.1)
Media	43 (28.1)
Relatives or friends	39 (25.5)
Midwife	20 (13.1)
Pediatric nurse	9 (5.9)
Infant nurse	8 (5.2)
Obstetrician	7 (4.6)
Pediatrician	4 (2.6)
General practitioner	1 (0.7)
Other	8 (5.2)

In addition, more than one third of women (35.9%; n = 55) stated they had never heard about the existence and activity of HMBs, neither before nor during pregnancy. Among those who had knowledge of HMBs (64.1%; n = 98), mass media played a fundamental role as source of information, followed by word of mouth from family and friends. It came out that the midwife is the health-professional that most often talks to women about HMBs and the possibility to donate human milk. After midwives, the women mentioned, in decreasing order, the pediatric nurse, the obstetrician, the pediatrician and the general practitioner (Table 3).

When we asked the women if they knew about the possibility of donating their own milk, 71.2% (n = 109) answered "yes", but when the question was "Do you know the procedure for donation?" a very high percentage (92.8 %; n = 142) answered "no". Only 7.2% (n = 11), in fact, answered to have received this kind of information by the midwives during pregnancy, by the staff of HMBs or through books, magazines, Internet and mass media.

Out of the whole sample of 153 women, 63.4% (n = 97) would have liked to receive more information about milk donation and 51.5% (n = 50) of these women wished the midwife to provide this information. After midwives, they mentioned the pediatrician, the obstetrician, the staff of the HMBs, the media and at last the general practitioner.

We also asked women (open questions) if they would like to use milk from HMBs in case of need of their baby and 56.9% (n = 87) answered "yes", especially for the following reasons: benefits of DHM to the baby; DHM is better than formula; infant's health; confidence in HMDs and HMBs (Table 4).

Out of 153 respondents, 43 (28.1%) instead answered they would not use DHM for the following reasons: formula preference; lack of information about DHM; lack of confidence in HMBs and fear of infections transmission; assumed difficulty in getting DHM. In the remaining 15% of cases, women did not answer this question (missing values).

Then, we asked women if they would be interested in donating their milk and the answers were very satisfactory: 45.1% said "yes", and 41.2% said "no" to donation.

The main reasons for donation in the 69 women who showed their interest in becoming donors were: to help other

Table 4. Opinions about Donor Human Milk

Would you be happy to use donor human milk to feed your son?	n (%)
Yes, because...	87 (56.9)
Benefits of donor human milk	34 (39.1)
Donor human milk better than formula	33 (37.9)
Infant's health	13 (14.9)
Confidence in human milk banks	7 (8.1)
No, because...	43 (28.1)
Formula better than donor human milk	17 (39.5)
Few information about donor human milk	12 (27.9)
Scepticism about human milk banks	11 (25.6)
Finding donor human milk is difficult	3 (7.0)
Missing values	23 (15.0)

Table 5. *Wish to Become Human Milk Donors*

Would you like to become a milk donor?	n (%)
Yes, because...	69 (45.1)
To help other infants	41 (59.4)
Altruism	13 (18.1)
To avoid waste of milk	7 (10.1)
Donor human milk benefits	4 (5.8)
Personal gratification	4 (5.8)
No, because...	63 (41.2)
Previous insufficient lactation	26 (42.3)
Little information about donor human milk	12 (19.0)
Insufficient time	11 (17.5)
Scepticism about human milk banks	7 (11.1)
Finding donor human milk is difficult	7 (11.1)
Missing values	21 (13.7)

Table 6. *Previous Breastfeeding Experiences*

Previous Breastfeeding Experiences	n (%)
How many children do you have?	
1	84 (54.9)
> 1	57 (32.4)
Missing data	12 (12.7)
How did you feed your baby?	
Breast milk	46 (80.7)
Formula	11 (19.3)
How was your milk production?	
Copious	20 (35.1)
Normal	19 (33.3)
Insufficient	18 (31.6)
Have you ever needed to empty your breast?	
Yes	25 (43.9)
No	32 (56.1)

infants; altruism; to avoid waste of human milk; awareness of the benefits that human milk provides compared to formula, especially for preterm infants, and personal gratification (Table 5).

Analysing the reasons given by mothers not available to become donors, we can see that 42.3% did not have enough milk for their previous infant and they were afraid to live the same experience even after the present delivery, thus precluding the opportunity to donate. They also gave other explanations: lack of information, which drives many women to be suspicious on the safety of DHM (mainly fear of infections transmission); the idea that the donation procedure is too difficult and demanding; the idea that donating milk requires a lot of time; the fear that donation deprives their own infant from mother's milk (Table 5).

The majority of respondents were primiparae (54.9%; n = 84), so they had no previous experience of breastfeeding. The remaining 32.4% (excluding 12.7% of missing values) were multiparae. Among these, 80.7% had breastfed, while 19.3%

had fed their infants with formula.

43.5% of mothers who had already breastfed believed to have had a large production of milk, but none of them became a donor. Even if only 20 women considered their production of milk as copious, with the following question we were able to demonstrate that the number was higher. In fact, 25 women said they needed to empty their breasts manually or with electric breast pump because the breast was painful for engorgement or because of abundance of milk (Table 6).

B. Interviews with HMDs

At the time of the interview, 5 women were still donating, while 2 mothers had recently terminated donation.

Firstly, we explored how the donors became aware of the possibility to donate human milk. Some mothers heard about it through media and Internet, while others were informed by health professionals or word of mouth.

Respondents' reasons for donation are described in Table 7. As the main reason for donation, all participants reported an excessive milk production, which is a necessary but not a sufficient reason to explain donation.

Many donors reported the wish to help other babies as one of the main reason for donation. One of them stated: "*I donate because I know that a lot of preterm infants are sick and I want to help them*".

Many women donate to avoid waste of milk and to use in a positive way the excessive amount of milk, as in the following quotation: "*Since I think that human milk is a very precious thing and I produced a lot of it, I did not want to waste it! We must always remember that milk is food... [...] Why should we waste it? Donation is the best solution!*"

Some women claimed that they started to donate for altruism, mainly to help other people and to be involved in voluntary actions: "*Basically it is a matter of altruism...I like to help people [...]. Absolutely I'd do it again because I like to be helpful to someone. In fact I donate blood too*".

For other women, the main motivation for donation was the knowledge about the benefits of DHM for preterm infants that they obtained by health professionals or media: "*When I talked to a nurse, she told me that human milk is precious like*

Table 7. Human Milk Donors' Reasons for Donation

Why did you decide to donate human milk?	n (%)
Because...	
I had too much milk	7 (100.0)
I wanted to help other infants	6 (85.7)
I wanted to avoid wasted of milk	6 (85.7)
I am altruist	5 (71.4)
I knew donor human milk's benefits for preterm infants	5 (71.4)
It's gratifying	3 (42.9)
The procedure is very easy	2 (28.6)
I've been encouraged by a health professional	1 (14.3)
I've been encouraged by family/friends	1 (14.3)

gold! So I thought: why not? [...] I hope that my milk is strong and healthy and can reinforce especially those premature babies who are so sick. [...] And the head nurse explained to me that, since I am the mother of a premature baby, my milk is very important because it is very consistent".

For a significant number of donors, the main reason to donate was the personal gratification derived from being useful to other people: "I'll tell you the truth: I'm very proud of myself! Helping the others by donating is very gratifying for me".

Some women said that the practice of donation does not involve any struggle or effort, so they were glad to help other infants spending so little energy: "I have a lot of milk (too much, maybe...) so I would have had to pump it anyway, otherwise my breast would started to ache. Besides, the practice of breast-pumping is not complicated and does not require too much time".

Finally, some donors mentioned being encouraged to donate by other people. A mother cited the influence of a health professional: "The head nurse proposed me to become a donor, although it was already an idea of mine "; another woman said that her family has been involved in her choice to become a HMD.

Social support seems therefore very important, because every HMD said that she has been sustained in her decision to donate milk by family and friends, who provided both emotional and practical support: "[I have been supported] especially from my husband, who thinks that milk donation is very useful. Then my parents suggested me to use their freezer to store milk bottles, because mine was full. And some friends congratulated me for my decision to donate and allowed me to use their freezers too".

The whole sample reported to be extremely satisfied with the decision of becoming a donor and stated that they would like to repeat the experience in case of a subsequent pregnancy.

In partial contrast with the findings from the questionnaires, according to which many women answered that they would never use DHM to feed their babies (because of lack of information or fear that DHM could transmit infections and diseases), interviews show that all donors would be happy to use it if their infants needed it.

Moreover, all HMDs focused on the excellent organization of HMBs, emphasizing positive aspects such as: the fact that the bank supplies bottles to collect milk; the possibility to use an ambulance to transport milk from donor's house to the bank; efficiency and courtesy of staff; measures taken to facilitate donors (e.g. jumping the queue to perform blood tests for suitability for donation).

Finally, respondents identified some possible barriers to recruitment of new donors, such as lack of information, lack of provision of breast-pumps from some banks, and insufficient number of HMBs in the Piedmont region.

C. Interviews with HMUs

All the HMUs affirmed to be happy that their infants received DHM, since they thought it is better than formula, and none of them had doubts about its safety. However, the whole sample stated that women should obtain more

information about the practice of donation and the origin and safety of DHM. In fact, only few HMUs had already heard about HMBs in the past (most of the women discovered the existence of HMBs only when their infant needed to use DHM), and none of them knew this initiative in detail. Hence, many of them would have liked to be better informed: "I think that mothers should receive more information about human milk donation, in order to promote this practice. It is necessary to raise awareness among women even outside of pregnancy. It would be useful to better inform all women during the reproductive age, to create a culture of milk donation".

Moreover, HMUs were very thankful to the donors and stressed the importance of DHM in preventing diseases: "The fact that my baby received DHM has been a great gift...a deed that is priceless!"

All of them were satisfied with the experience of being HMUs and appreciated the excellent organization of the bank.

Furthermore, every HMU in the study would have liked to become a HMD, especially to help other sick babies and to reciprocate the favour: "I personally experienced this situation, so I am very sensitive about this topic. I'd like very much to return the favour".

IV. DISCUSSION

Questionnaires show that the interviewed women were well aware of the benefits deriving from human milk and they would have liked to breastfeed their babies.

Nevertheless, mothers' knowledge about the importance of human milk in preterm and low birth weight infants is still insufficient, and many investigated women did not know that it protects from several disorders reducing neonatal mortality. In order to promote human milk donation, lack of information has a negative impact, since women who do not know the DHM's benefits will hardly approach to the practice of donation (in fact, knowledge of the benefits of DHM for premature infants is the main reason mentioned by women interested in becoming donors). Therefore, lack of information is one of the most important barriers that affect donation.

Analysing data about the sources of information on HMBs, we notice that media and word of mouth play a role of primary importance, while the intervention of health professionals is still not crucial. Some Brazilian studies [20], [23], instead, show a much greater involvement of health professionals in sensitizing women to human milk donation, so it may be appropriate to develop some strategies including medical personnel to promote donation. However, this study shows that the professional role more involved in the process of "education to milk donation" is the midwife, who informs women about HMBs during pregnancy.

The fact that more than half of the sample declared that would have been happy to use DHM to feed their babies shows that mothers' perception on the activity of HMBs is positive. Fears and concerns, that at present worry some of the respondents, could disappear providing more detailed information about DHM.

Another important point emerging from the questionnaires

is that a significant number of mothers would be interested in donating milk. However, efforts should be directed towards those women unwilling to become donors, since most of the reasons they put forward may be bypassed providing them more detailed and accurate information. In fact, the interviews to HMDs and HMUs showed a different attitude: on one hand, donors often stated that donation does not require too much effort, both in terms of time and waste of energy (indeed this is an aspect ranked among the facilitators, namely one of the main reasons that encourage women to donate), on the other the HMUs underlined that the DHM administered to their infants appears highly checked and safe for health.

The reasons why HMDs decided to donate are almost similar to those mentioned in other studies and can be considered as facilitators themselves, i.e. decisive elements for the promotion of donation [14], [19], [20], [22], [23].

The study has some limitations. In fact, for the quantitative research we chose an opportunity sample that may not be representative of the general population (even if the socio-demographic data obtained were similar to those of the general population admitted to Sant'Anna Hospital in 2014). Furthermore, the qualitative research is a small pilot study. The Authors have in mind to fill these gaps in future studies.

V. CONCLUSION

Most of the previous studies on human milk donation focused on clinical and scientific perspectives and did not investigate the mothers' perceptions, which play an essential role in the milk donation process.

This study shows that many women are not aware of the importance of human milk in preterm and sick infants' feeding and most of them do not know HMBs. Therefore, the lack of information is one of the most important barriers that affect donation.

More than half of respondents would have been happy to use DHM in case their baby needed it and a good percentage of them would have been interested in becoming a donor.

Also HMDs and HMUs reported a big lack of information among women of childbearing age and identified as possible barriers to the recruitment of new donors the fact that some bank does not provide breast-pumps and that the number of HMBs in Piedmont region is still insufficient. Moreover, they listed a lot of facilitators to donation, such as: encouragement from health professionals; encouragement from family members or friends; support from relatives and friends; the excellent organization of HMBs and the kindness of the staff.

These findings are very promising and could be used to develop some strategies in order to promote and support human milk donation.

This survey represents the starting point for further research exploring the practice of donating milk in different Italian and European realities.

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