DOI: https//doi.org/10.13037/ ras.vol18n66.7313

Original Article

Recebido em: 26/08/2020 | Aceito em: 14/10/2020

Discard assessment of donated milk to a human milk bank

Avaliação do descarte de leite doado à um banco de leite humano

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Abstract

Introduction: Human Milk Bank is a specialized center responsible for guiding and executing the operations of collection, receipt, selection and classification, processing, quality control and distribution of human milk donated to newborns who cannot be breastfed. **Objective**: evaluate the number of donors, the amount of milk donated, discarded and check the main reasons for the disposal of donated human milk. **Method**: This is a retrospective observational study, carried out in a Human Milk Bank of a hospital located in the Midwest in Paraná state, Brazil, from May 2015 to April 2016. Secondary data from donated human milk records were used. Data on the number of donors, volume of donation, volume of donation and discarded and the reason for disposal were analyzed. **Results:** A total of 763.3 L of breast milk donated in one year were counted by 848 donors. Total of 538.6 L of milk were pasteurized and 224.7 L of milk were discarded due to the presence of dirt and high acidity. **Conclusion**: Under the conditions of the present study, a high volume of disposed milk was found due to the presence of dirt or high acidity.
Keywords: Human milk; breastfeeding; donation.

Resumo

Introdução: Banco de Leite Humano é um centro especializado responsável por orientar e executar as operações de coleta, recebimento, seleção e classificação, processamento, controle de qualidade e distribuição do leite humano ofertado aos recém-nascidos que não podem ser amamentados. **Objetivo**: avaliar o número de doadoras, a quantidade de leite doado, descartado e verificar os principais motivos do descarte de leite humano doado. **Métodos**: Trata-se de um estudo retrospectivo observacional, realizado em um Banco de Leite Humano de um Hospital localizado no Centro Sul do Paraná, Brasil, no período de maio de 2015 a abril de 2016. Utilizou-se dados secundários dos registros do leite humano doado. Foram analisados dados do número de doadoras, volume da doação, volume da

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doação descartada e o motivo do descarte. **Resultados:** Foram contabilizados um total de 763,3 L de leite materno doado no período de um ano por 848 doadoras. O total de 538,6 L de leite foram pasteurizados e 224,7 L de leite foram descartados pela presença de sujidades e acidez elevada. **Conclusão**: Nas condições do presente estudo foi verificado alto volume de descarte de leite humano ordenhado decorrente da presença de sujidades ou acidez elevada, evidenciando problemas na ordenha e estocagem do leite.
Palavras-chave: Leite materno; aleitamento; doação.

Introduction

Breastfeeding benefits are well reported in literature with recognized effects for children, mothers, and society[1]. According to the Ministry of Health, breast milk is the ideal food for newborns because it meets nutritional needs and meets physiological peculiarities in this life cycle [2]. Exclusive breastfeeding is recommended until the child's sixth month of life and supplemented for up to two years or more[3].

There are situations resulting from various reasons that the breast milk of the breastfeeding mother is not available, cannot be offered or is insufficient to meet the nutritional needs of the infant, who starts to be fed with artificial formula. In this way, Human Milk Banks (HMB) offer a solution for the supply breast milk to premature or sick newborns, as well as those who are unable to receive sufficient volume of breast milk for different maternal causes[3].

HMB are non-profit institutions responsible for guiding and executing the operations of donation, receipt, selection and classification, processing, quality control and distribution of human milk (HM). Its function is to guarantee milked human milk (MHM), to all those newborns, who may be premature and of low weight or who are unable to be fed directly to the breast by the mother, especially when admitted to the Intensive Care Unit (ICU) neonatal, medium-risk ICU or in hospital pediatric clinic[4, 5, 6].

On May 19, is celebrated the World Day for Human Milk Donation, and several actions are carried out for its dissemination. There is a low knowledge level among the population about the HMB existence and the effective practice of donating milk by society points to flaws in policies to encourage breastfeeding [7] and put HMBs on alert in maintaining stocks of human milk in order to meet their needs. public.

Therefore, there must be several strategies to achieve this goal through awareness campaigns on the importance of donating human milk in communities and actions for care in milking and storage at the donor's residence. Milk donated to HMB must undergo quality assessment procedures to be distributed to newborns.

Studies indicate that the main reason for the donated milk disposal is the donor's lack of care in the environment outside the HMB. Disposal is related to changes in microbiological properties of milk, making it unsuitable for use. There are still problems with collection procedures such as contaminants and dirt, cleaning utensils and using an inappropriate collection bottle to store MHM, and personal hygiene.

After collection, care with pre-storage and storage for maintaining the cold chain at the donor's home also contributes to increasing the disposal of donated human milk[8,9]. Thus, it is necessary to implement encouraging breastfeeding and encouraging the human milk donation across the country[10], coupled with monitoring the causes of breast milk disposal in the HMB, seeking to minimize milk losses and the frequent lack of milk[8] to meet the demands mainly in neonatal ICUs.

The investigation through this study aimed to evaluate and understand the actions developed by HMB in relation to

the number of donors, the amount of human milk donated, discarded and to verify the main reasons for the disposal of human milk donated to an HMB located hospital in the Center-South of Paraná, Brazil, trying to point out the actions to minimize the losses of donated Human Breast Milk.

Materials and methods

Sample and type of study

This is a retrospective observational study, carried out in an HMB of a Hospital located in the Center South region of Paraná. This study was approved by the Research Ethics Committee of the State University of the Midwest (UNICENTRO), under number of Opinion 1,593,833, linked to the University Extension Project "Actions for Education, Care and Nutritional Assessment for patients and employees of hospitals in Guarapuava / PR ". The Informed Consent Term was waived, considering that this is a research with secondary data.

Research design

This study was conceived as part of the celebrations and actions related to World Day of Human Milk Donation held in May/2016. Procedures were carried out in compliance with Resolution-RDC No. 171 of September 2006 from the Ministry of Health17. For breastfeeding mothers choose to be donors, the HMB team (Nutritionist or Nurse) went to the residence to register, evaluate the prenatal portfolio and check the health tests performed and possible issues related to maternal health and, thus, guidelines for collecting and storing HM were carried out. The HMB team carried out the weekly transport of breast milk by milking to the HMB.

Inclusion and Exclusion Criteria

Collection of secondary data records from the MHM files for the period from May 2015 to April 2016. The HM was milked by the donor who underwent guidance, at home and the entire amount of milk collected by the HMB team for one year served as a basis for data analysis.

Procedures

When human milk arrived at the HMB, it underwent a first analysis for disposal immediately after thawing raw milk in a water bath, where it was observed if there were visible dirt at the bottom of the bottle. When the presence of some dirt was verified, it was classified as: biological or non-biological origin. When it was not of biological origin, the apparent dirt was removed using a sterile pipette, and the milk was passed on to the second analysis, which evaluated the milk smell. When dirt of biological origin was detected, such as hair or insects, the milk was discarded. In the bottles approved in this step, the milk smell was measured, discarding those with an acidic or inappropriate smell. The remaining bottles then passed the second acidity test, carried out with phenolphthalein and sodium chloride, which discarded those milks that had an acidity greater than or equal to 8.0 ºD. The milks that passed all tests went on for pasteurization and were only discarded if they showed any apparent dirt at the end of the process or when they failed the microbiological test.

Table 1: flow chart of the procedures adopted by HMB for the pasteurization process of human milk

MILKING OF HUMAN MILK
↓
HOME FREEZER STORAGE
↓
TRANSPORTATION TO HBM
↓
PH PREPARATION FOR PASTEURIZATION
↓
DEFROST IN WATER BATH
↓
QUALITY CONTROL
↓
DISPOSAL OF MILK BY DIRT
↓
PH TESTS
↓
DISPOSAL OF ACIDITY MILK
↓
REFIIL IN BOTLLE
↓
PASTEURIZATION
↓
STORAGE
↓
MICROBIOLOGICAL TEST
↓
DISTRIBUTION

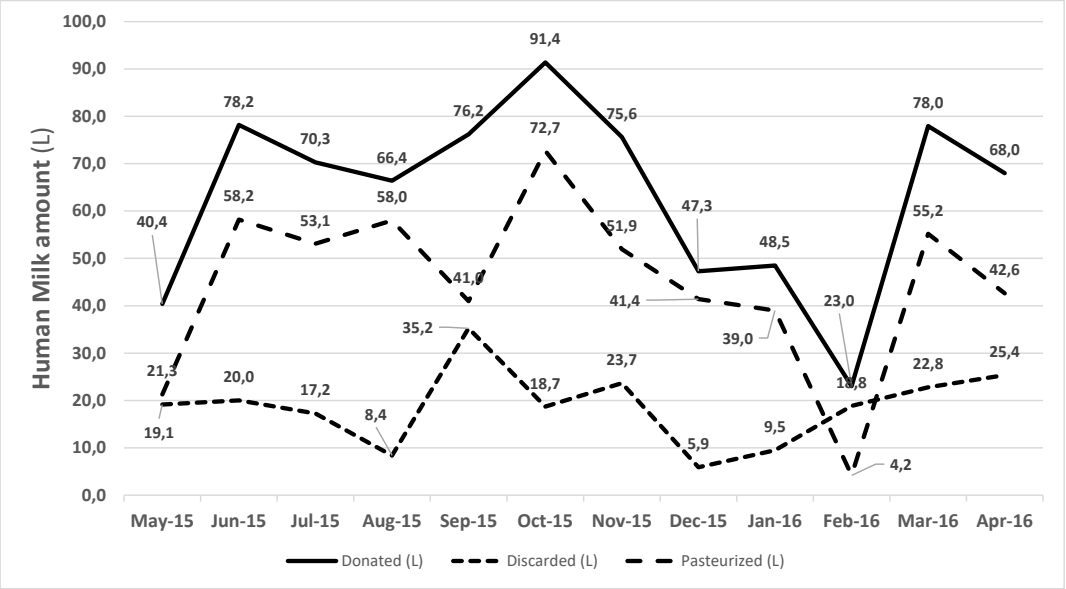
Data from the donors' number, milk donation volume, volume of donation discarded and the reason for the disposal were selected from the HMB files. Data were analyzed using descriptive statistics, using means, standard deviation (SD) and relative and absolute frequencies. Descriptive values were expressed as mean ± SD and levels of significance for p values ≤ 0.05. The normality test (Shapiro-Wilk) was performed to verify the normality distribution of numerical variables. The comparison of numerical variables was performed using the T-student test of paired samples performed with the IBM-SPSS® Statistics 25 software.

Results

In the period from May 2015 to April 2016, the evaluated HMB had 848 donors, with 763.3 L of total donated milk in the period. After quality analysis, 538.6 L (70.6%) of milk went through the pasteurization process and 224.7 L (29.4%) of milk were discarded.

Figure 1 shows the quantities of donated, pasteurized, and discarded breast milk. The monthly average of donated milk was 63.6 ± 19.6 L, with the largest amount of 91.4 L donated in October, while the lowest amount of 23 L was donated in February and therefore, the same happened with the amount of pasteurized LH with 72.7 L in October and 4.2 L in February, making a monthly average of 44.9 ± 18.2 L. Statistical differences were verified between the amount of milk donated compared to the pasteurized bed (p <0.001).

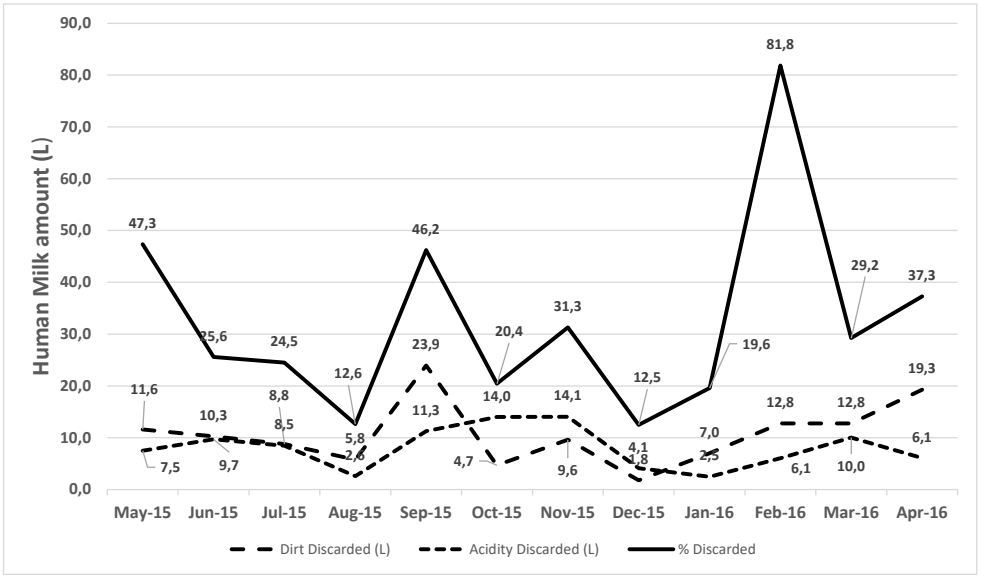
Figure 1: Amount of milk processed at the Human Milk Bank between May 2015 to April 2016 - Guarapuava - PR.



The discarded milk amount had an average of 18.7 ± 8.0 L. In September, there was the largest discard with 35.2 L, and in December, the lowest discard amount, 5.9 L (Figure 1). The average percentage of discarded milk was 32.3 ± 19.3% and, in February, the disposal of donated milk reached the highest percentage, being 81.8% (Figure 2).

The main reason why breast milk was discarded (Figure 2) was the dirt presence, in particular, the appearance of hair strands, insects and clothes lint, thus accounting for a total of 123.8 L with a monthly average of 10,7 ± 6.6 L rejected. The high acidity, when greater than or equal to 8 ºD, presented a discard in the amount of 96.4 L and monthly average of 8.0 ± 4.0 L. Respectively, these reasons represented 57.1% and 42.9% of the total human milk discarded, with no statistical difference was observed between the amount of milk discarded due to dirt compared to milk discarded due to high acidity ($p < 0.183$).

Figure 2: Quantity of milk discarded in the Human Milk Bank between May 2015 and April 2016 - Guarapuava - PR



Discussion

The present study reported that the number of breast milk donors was 848, which shows a significant increase according to study carried out in the same HMB in its first year of operation (October 2013 to October 2014) where there were only 57 donors[13]

This number may represent the HMB actions, the media campaigns to increase the donors number, the population's knowledge about the work developed at the bank, and, in particular, the mothers who were referred to service due to complications in the breastfeeding process and that after they become donors and disseminate the work of the establishment.

The total volume of donated milk was 763.3 L and the amount of milk discarded was 224.7 L, making a total of 29.4%. A local study found that in the first year of HMB operation the percentage of disposal was 15.3%, but the volume of donated milk (402 L) and the number of donors (57) was lower[13]. Research carried out in the HMB of Varginha-MG, in the first semester of 2008, presented a percentage of disposal close to that of the present study (27.4%)[9]. Work carried out at the HMB of Clinic Hospital in Curitiba-PR found that in 2006 the percentage of human milk donated was 24%, however, after the development of a checklist delivered and explained to the donors with the main reasons for the disposal showed a decrease in the percentage to 10.5% in 2008[11].

According to report of Brazilian Network of Human Milk Banks in 2015[16] (January to December), the volume of consolidated collected milk for the Parana State was 18,791.7 L and the distributed milk was 12,512.8 L. In the report there is no discarded milk record, however we adopted that 6,278.9 L. of milk that were not distributed were discarded, which makes a total of 33.4%, a value above that found in the present study.

The study demonstrated a seasonality in the volume of monthly breast milk donation, which is already expected and reported historically by the Brazilian Network of Human Milk Banks [12].

As can be seen in the may month the volume of donated milk was 40.4 L, in that month, in particular, on the 19th of May, the world day for the donation of breast milk is celebrated and, according to local records, the Steering Committee Municipal Breastfeeding Initiative promoted an action in partnership with educational institutions and the municipal health secretariat in the city center publicizing this date and the HMB work [18].

This action was reflected in increase in milk donation in June month (78.2 L), but in the subsequent months, July and August, there was a decrease in the donation, as these are the coldest months in the municipality and, in September, there was a resumption of donations generating an increase in the volume donated, which may be due to celebration of the world breastfeeding week that takes place in August, reaching the month of October with the largest donated volume (91.4 L), however in the December and January months the volume decreased again as they were months of school vacations, with family trips, in February there was the smallest donation (23 L) and the resumption of volume increase took place again in March (78 L). According to the Ministry of Health, the first months of the year, which coincide with school holidays or extended holidays, are the ones with the least number of donations of breast milk[12]

The donation seasonality is a factor to be considered, as it can affect the stocks and supply of milk for neonatal maternity wards and/or ICUs, thus ensuring a demand and recruitment of donors becomes essential, as well as, orienting

them regarding procedures in the process of milking and stocking breast milk at home in order to reduce the disposal of donated milk.

The study showed a statistical difference between the volume of donated milk and the volume of pasteurized milk (70.6%), given the volume of discarded milk (29.6%). The main reason for discarding milk was the dirt presence (57.1%), followed by the high milk acidity (42.9%), but there was no statistical difference between the amount of milk discarded by dirt and high acidity.

The results of the present study in terms of breast milk disposal differ from those found in the literature. A study carried out in the first year of operation of the HMB of the present study (October 2013 to October 2014) found that the disposal of milk due to dirt was 90.4%[13], higher than that reported for the period from April 2015 to May 2016 (57.1%).

Research developed with data from an HMB of a school hospital in the northwest region of Parana in 2018 observed that the main reason for discarding milk was the presence of hair (48.8%), followed by dirt (19.7%), foreign body (8.8%), microbiological positive (6.8%) and others (15.8%)[19]. As there was a classification of reasons different from that adopted in the present study, if we add the percentages of the presence of hair, dirt and presence of foreign body, we will have a higher value (77.3%) than reported in the present study for the dirtiness reason

Work carried out at the HMB in Varginha-MG, in the first semester of 2008, showed dirt disposal values of 5.3%, but after the milk has gone through the pasteurization process, which does not allow comparison with the present study. The reasons for disposal before pasteurization could not be identified individually, as sometimes one or more characteristics occurred in the same sample (disposal due to packaging problems, off-flavor, color and/or dirt)[9]. Discard due to acidity was much lower (2.6%) than the present study (42.9%).

The main reason for discarding breast milk in the study was due to the dirt presence found in bottles, which shows problems when milking the milk. MHM is discarded by dirt when it presents a biological risk, that is, when it may originate from biological agents, such as bacteria, fungi, parasites, protozoa, viruses, among others. As an example of dirt found are hair, eyelashes, nails, animal hair and fleas. Dirt of non-biological origin, such as pile towels, does not result in disposal, when they can be removed with the pipette[11].

According to the Manual on the operation, prevention and control of HMB risks, milking can be considered as part of the quality control of MHM, since if it is not well conducted, the product may present dirt, strange odors, and, therefore, it cannot be used[8]. It is recommended to choose a clean, quiet place and away from animals; pin and cover the hair with a cap or scarf; avoid talking while expressing milk or using a mask or diaper covering nose and mouth; wash hands and forearms with soap and water[8]. This process needs to be clear and explained to the donors and constantly reinforced by the HMB team that collects milk at home, as it is a step that depends exclusively by the donors.

The other reason for discarding milk highlighted by the present study was the high acidity, which denotes problems with storage of milked breast milk. The storage is considered a set of activities and requirements to obtain a correct conservation of the MHM at a temperature and time over which the product is kept before its processing (pasteurization) until the moment of its use. Thus, the MHM must be stored under freezing, right after milking. The human milk acidity can be classified as original and developed. The original results from the presence of its constituents (micelles of casein and mineral salts) and the developed one, which is due to bacterial growth, of the

primary and secondary microbiota, with the lactic acid production. As the microbiota finds favorable conditions for growth, there is the lactic acid production and the consequent increase in acidity[8].

Grazziotin *et al.* (2010)[12] have reported that there are several causes of donated human milk being discarded during the donation process. Among them, following stand out: 1) In milking it was: The first collection without guidance; 2) In pre-storage: Forgetting milk outside or at the refrigerator door, Using the inappropriate bottle, Problems with the freezer and Opening the fridge and/or freezer a lot; 3) In transport: Transport of milk from work to home for storage.

Once again, it is possible to perceive the importance of constantly advising donors on procedures immediately after milking, with the reducing purpose the disposal of donated milk due to exposure of product to ambient or inappropriate temperature, which promotes microorganisms proliferation and acid lactic production, with consequent increase in milk acidity, making it unsuitable for consumption.

A study with 28 donors registered in the HMB in a hospital in Viçosa-MG, through interviews during home visits, found that the main facilitator of human milk donation process was home collection, on the other hand, it was pointed out as the biggest hindrance to lack of time for milking and hygiene care necessary in the process[14]. This investigation with women donors expressing their difficulties in donation process may partly explain the high percentages of MHM discards[15].

The human milk donation is a voluntary and solidarity act, and the donor, in this process, needs to be considered, as she has her baby, her domestic, professional chores, often overloaded with numerous tasks, which can lead to not performing all appropriate procedures at the time of milking and storage. The HMB team needs to be sensitive so as not to discourage milk donation, but on the other hand, they need to guarantee the quality of this milk. One measure that can be taken to minimize the loss of donated milk is to work more intensively with donors who have had problems with the quality of their milk.

This study has limitations because it does not characterize the donors sociodemographic profile, which can provide information relevant to the causes of the milk disposal.

Conclusion

This study demonstrated a seasonality of human milk donation and a high amount of disposal of milked milk, indicating a deficiency, especially in milking process and possibly in the storage of milk until collection by the HMB. The presence of dirt and high acidity are the main reasons for discarding and the month with the highest percentage of discarding due to acidity may be due to contamination or due to high ambient temperatures.

Disposal occurred due to the presence of dirt and high acidity due to inappropriate handling practices. Therefore, actions by health professionals at all levels of care are necessary to raise awareness of donors, with a view to increasing adherence to human milk donation in compliance with the rules of the HMB legislation.

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Como citar este artigo:

Schiessel DL, Luz FR, Holzer ME, Saldan PC, Boaria F, Tortorella CCS, Cavagnari ABV. Discard assessment of donated milk to human milk bank. Rev. Aten. Saúde. 2020; 18(66): 15-24.