



## Donor milk volume and characteristics of donors and their children



Gemma Sierra-Colomina<sup>a</sup>, Nadia Raquel García-Lara<sup>a,b,\*</sup>, Diana Escuder-Vieco<sup>a,b</sup>, Clara Alonso-Díaz<sup>a</sup>, Eva María Andrés Esteban<sup>c</sup>, Carmen Rosa Pallás-Alonso<sup>a,b</sup>

<sup>a</sup> Department of Neonatology, 12 de Octubre Hospital, Madrid, Spain

<sup>b</sup> SAMID (Spanish Collaborative Maternal and Children Research) Network, Spain

<sup>c</sup> Clinical Research and Epidemiology Unit, IMAS12-CIBERESP, 12 de Octubre Hospital, Madrid, Spain

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### ABSTRACT

**Background:** Little is known regarding the effect of the characteristics of donors and their children on the volume of donor milk delivered to a human milk bank (HMB).

**Aims:** Our study aimed to determine the relationship between different social and demographic variables of donors and their infants with the volume of human milk delivered.

**Methods:** We included donors accepted at the Hospital Doce de Octubre HMB from January 1st, 2009 until April 31st, 2013, and who had finished their donation. Data of social and demographic characteristics of the donors and their children, and the total volume of DHM given were obtained from our HMB database. Included variables were previous donors, donor age, number of children, place of residence, gestational age of the infant at birth, child's age at the start of the donation, hospital admission, and death of the infant.

A linear regression model was used to study the relationship between independent variables that were significant in bivariate analysis and the volume of donated milk.

**Results:** A total of 415 donations from 391 women were included. The median volume of milk delivered was 3.1 l (IQR—interquartile range—1.3–8.3 l). In the linear regression model, previous donors, smaller gestational age of children, and the start of donation at earlier stages of lactation were associated with a larger quantity of HMB donated ( $p \leq 0.001$ ).

**Conclusion:** Previous donors, smaller gestational age of children, and the start of donation at earlier stages of lactation are associated with a larger quantity of milk donated to the HMB.

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## 1. Introduction

Nowadays there is a great demand for donor breast milk, particularly for preterm infants and other newborns suffering from diverse medical problems [1]. Previous studies have described the function of human milk banks (HMBs) and the use of donor human milk (DHM) [2,3]. However, little is known regarding the characteristics of milk donors [4–9] and even lesser regarding how these characteristics can influence the amount of milk donated [6]. Only one published article [6] has studied the relationship between the characteristics of breast milk donors and how these characteristics could affect the amount of human milk delivered. As a secondary objective of the research, they studied the variables of age, level of education, employment, household income, marital status, ethnicity and number of children. They only found an

inverse relationship between age and donation amount (younger women donated more milk). As far as we know, no published studies have focused on the influence of the characteristics of donors' children such as gestational age at birth, admission to hospital, death, age at the starting time of donation and the donation amount.

This study aims to determine the relationship between different social and demographic variables of human milk donors and their children with the volume of human milk delivered.

## 2. Methods

### 2.1. Operation of the Human Milk Bank of the University Hospital Doce de Octubre

The HMB of the University Hospital Doce de Octubre was opened in December 2007 [10]. This is the only HMB in the Madrid community, in the Spanish central region, which has a population of 7 million inhabitants. Integrated in the Neonatology Service of the same hospital, the HMB supplies DHM to admitted newborns under medical prescription. The HMB has no home-collection system.

\* Corresponding author at: Servicio de Neonatología, Hospital 12 de Octubre, Edificio Materno-Infantil, Avenida de Córdoba sin número, 28041 Madrid, Spain. Tel.: +34 913908272, +34 678307549 (mobile); fax: +34 913908272.

E-mail address: [nadiaraquel@yahoo.es](mailto:nadiaraquel@yahoo.es) (N.R. García-Lara).

In the selection process, candidates filled in a lifestyle questionnaire that included social and demographic data about themselves and their child. Serology of hepatitis B, C, VIH 1 and 2, HTLV I and II, and syphilis was performed in the women. Exclusion criteria included women with positive serology for the above-mentioned infections, and those exposed to any risk factor of a sexual or blood transmissible disease in the last 6 months. Strict vegetarians, smokers, habitual alcohol consumers or drinkers, or those drinking more than two caffeine drinks per day were excluded. Women who were donors during breastfeeding of previous infants and those who wanted to donate their surplus milk after the death of their infant were accepted. There was no limit on the age of the infant for donation of milk or on the volume of milk. Questionnaire data are routinely included in the HMB database. The database automatically calculates the volume of milk that a mother donates as soon as it is registered.

## 2.2. Participants and procedures

All donors accepted into the HMB at Doce de Octubre Hospital from January 1st, 2009 until April 31st, 2013, and who had already finished their donation were included in the study. Women who donated milk at different periods of time with regard to breastfeeding of more than one of their children (previous donors) were included. The amount of milk donated during each period of time was classed as a different donation. All donors were asked for their authorization for their data to be used in a research study. Confidentiality was provided to all participants who were informed about the terms of consent. All procedures followed were in accordance with the ethical standards of the Ethical Committee of the University Hospital Doce de Octubre.

The donors' social demographic data, such as age, place of residence, being previous donors and number of children, were studied. The following information regarding the infants were also included: gestational age, hospital admission, death of an infant, and age at the start of donation.

## 2.3. Statistics

To describe the volume of human milk delivered, the median, interquartile range (IQR), and quartiles were used because the data did not follow a normal distribution. A bar chart was also included (Fig. 1).

Continuous variables apart from donor age were categorized and treated statistically as qualitative variables. Gestational age at birth was categorized into three groups: <32 weeks, 32–36 weeks, and >37 weeks. The age of infants at which donation was begun was categorized into two groups: <4 months and  $\geq 4$  months.

Percentages were computed for categorical variables, and medians and IQRs were calculated to describe the continuous variables.

To study the relationship between social and demographic variables of donors and their infants with the volume of human milk delivered, the chi-squared and Spearman's rho test were used. A linear regression model was used to study the relationship between independent variables that were significant in bivariate analysis and the volume of donated milk. The logarithm of the volume of DHM was used as a continuous variable in the model. Significance was acquired with  $p < 0.05$ .

## 3. Results

### 3.1. Participant characteristics and volume of DHM delivered

A total of 415 donations of 391 women were included in the study. The median age of the women was 33.6 years (IQR: 31–36 years). A total of 93.2% (382/410) of women lived in Madrid. Among the donors, 55.9% (229/409) were primiparous, 37.9% (155/409) had one infant, and 6.1% (25/409) had two or more children. A total of 5.8% (24/415) of women had donated milk with previous infants. A total of 23.1% (96/415) of donors had preterm infants; 9.9% (41/415) was under 32 weeks of gestational age and 13.2% (55/415) was between 32 and 36 weeks of gestational age. A total of 36.6% (152/415) of donors had their infants admitted to the neonatal unit and 4.1% (17/415) died. A total of 65.1% (262/415) of women started delivering DHM when their infant was less than 4 months. The donors started donating when their children were at a median age of 2.9 months (IQR: 1.3–5.7), ranging from 0 to 28 months.

DHM volume is shown in Fig. 1. The median volume of milk delivered was 3.1 l (IQR: 1.3–8.3 l), and it ranged from 0.04 l to 174 l. The first quartile ranges from 0.04 to 1.26 l; the second quartile from 1.26 to 3.1 l; the third quartile between 3.1 and 8.26 l and the fourth quartile from 8.26 to 174.92 l.

Regarding the bivariate analysis, there was no statistically significant relationship between the donor age and the volume of milk delivered ( $p = 0.96$ ). Mean and SD values (in brackets) of donor age (years) for every quartile group were 33.1 [3,8] for the first quartile, 33.4 [4,6] for the second quartile, 33.3 [4,6] for the third quartile and 33.3 [4,2] for the fourth quartile. The results concerning the rest of the characteristics (that are categorical) and the amount of milk delivered (divided into 4 quartiles groups) are shown in Table 1.

In the regression model, women who had been milk donors previously donated significantly more milk than those who hadn't been donors previously. Similarly, the lower the gestational age of the infant and the sooner that donors started their donation, the more milk they donated (Table 2). The place of residence and admission of the child to hospital did not modify the amount of donated milk.

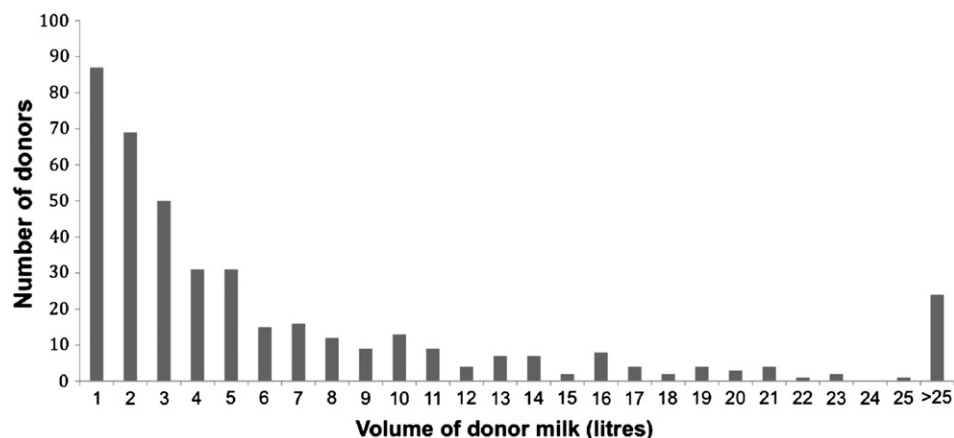


Fig. 1. The bar chart shows the number of donors that donated milk.

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