

Original Research Article

Sociodemographic and clinical profile of human milk donors and their infants in a model human milk bank: a descriptive cross-sectional study

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ABSTRACT

Background: Human milk banking depends on donations and characterization of donors seems important. We aimed to determine prevalence of human milk donors and profile of regular donors and their infants.

Methods: Cross-sectional study done on human milk donors in model HMB in tertiary NICU for six months. Donors who had donated for more than 30% of their hospital stay considered as regular donors. Their sociodemographic and clinical profile along with their infant status recorded from history, examination and health records.

Results: Prevalence of Human milk donors in our HMB was 71.3% and that of regular donors was 27.08%. 616 eligible to donate. 234 regular donors included separating 382 defaulters. Excluding 17, 217 regular donors enrolled. Religious beliefs did not deter donation. 65.43% had school education. 90% donors belonged to middle socioeconomic class. Three fourths already had 2 living children. Majority delivered vaginally (62.67%) in health facility offering level II neonatal NICU care (42.86%). Regular donors stayed in hospital with their sick infants for mean (SD) period of 13 (4.21) days. Mean (SD) Post-natal age of commencement of milk donation among regular donors was 9 (3.47) days. Breast-feeding rate was 87.09%. Regular donors had delivered very low birth weight (42.86%), SGA (53.46%) infants who stayed in hospital for mean (SD) duration 18 (6.86) days.

Conclusions: The prevalence of Human milk donors in our HMB was 71.3%. Only one third of them were regular donors. No religious barriers for donation observed. Educated socioeconomically secure multiparous donors made sustained donations. Health status and length of Postnatal stay in hospital of mothers and infants seemed to have a bearing on sustained donation.

Keywords: Clinical, Donors' infants, Human milk banking, Milk donors, Regular donation, Sociodemographic

INTRODUCTION

The demand for donor milk is growing exponentially, particularly for preterm infants and other newborns suffering from diverse medical problems.

This growing demand has led to the establishment of Human milk banks (HMB) both in the public and the private sectors all over the country.¹ Many systematic protocols have been formulated and recommended for collection, storage and dispensant processes of the

donated milk in the milk bank.² But getting donations is the first step in this process and milk banks depend on donations from lactating mothers who have surplus milk or unable to lactate their own infants for various reasons.³ It has been a challenge for the milk banks to increase the volume of donations to meet the ever-increasing need for donor milk.

Recruitment of new donors and increasing the volume and frequency of each mother's donation has become a priority in most HMBs. Thus, the success of human milk

banking largely depends on donations and hence adequate characterization of donors seems quite important.⁴ The profiles of the human milk donors and their motivating factors for donation have been studied in various parts of the world.^{1,3-9}

Though considerable number of human milk banks have been established all over the nation till date, there is paucity of literature which looks at the question of who donates human milk in our country. India is a country with diverse cultural, religious and political beliefs, education and economic circumstances. The sociodemographic profile pattern of milk donors in developing nations like India may be different from developed nations which have contributed the maximum research in this area.

The pregnancy morbidity patterns may have huge impact on milk donation in their postnatal period. All the global research on the characterization of Milk donors have not studied the health status or the disease patterns of the milk donor's infants.⁹ Various other factors like duration of maternal and infant hospital stay during the postnatal period which may influence proximity to HMB for donation are yet to be analysed. Hence, we felt a need to study the Sociodemographic and Clinical characteristics of Indian human milk donors and their infants. This could be used to discover new and better strategies for new donor recruitment and thereby focus on factors to increase and sustain milk donation among the donors in this part of the developing world.¹⁰

METHODS

We conducted this descriptive cross-sectional study in a Model Human Milk Bank at a tertiary neonatal care centre in South India for a period of six months from October 2017 to April 2018 after approval of present study protocol by Institutional ethical committee. All consecutive postnatal mothers who visited our Milk bank were considered eligible for breast milk donation once they satisfied our screening criteria for Human Milk Bank donation by guidelines.² At the time of discharge, the duration of hospitalization of the milk donors and their infants and details on their period of donation during their stay in the hospital were recorded from the NICU and Human milk Bank registers respectively.

Each day was counted as one donation day irrespective of the quantity donated and frequency of donation. Mothers who had donated for more than one day during their hospital stay were considered eligible to participate in the study. Among the eligible donors, mothers who donated milk for less than 30% of their hospital stay were considered as defaulters and more than 30% of their duration of stay in the hospital were considered as regular donors. The regular donors were included in the study and approached for consent to participate in the study. Mothers who refused consent to participate in the study or whose patient information was missing in the registers

were excluded from the study. The demographic variables like age, residence, religion, employment status during the antenatal period, education, family size and their socioeconomic score on Modified Kuppasamy scale were noted in data proforma.¹¹ Their clinical details like parity, antenatal visits, place and mode of delivery, complications like anemia (hemoglobin < 7g/dl), Gestational diabetes, pregnancy induced hypertension and postpartum hemorrhage and postnatal age when milk donation commenced were recorded from their history and antenatal and natal records.

The place of delivery was categorized based on the level of NICU care offered at the hospital facility irrespective of government or private organization. The details on infants' gestational age at birth, birth weight, intrauterine growth status, sex, order of birth, morbidity pattern and length of hospital stay were recorded from the hospital case records.

Morbidities which could impact on the length of hospitalization and difficulties in breast feeding and feed tolerance were recorded from case records and clinical examination. The descriptive data were collected as categorical and continuous data. Categorical data were summarized as percentages and proportions. Continuous data were summarized as means and standard deviation if normally distributed or medians and Interquartile ranges if skewed in distribution.

RESULTS

During present study period 864 mothers visited our Human milk bank for milk donation. Among them 16 mothers did not fulfil the criteria for milk donation mentioned in the guidelines for Human milk donation due to infectious causes. Thus, among these 848 lactating mothers, 232 mothers had donated milk only once either during their hospital stay or postnatal visits.

These 232 mothers were considered as Non-donors in the study. Hence 616 milk donors became eligible to participate in the study. Among the 616 eligible donors, 234 donors who had donation period more than 30% of their hospital stay were considered as regular donors and included in the study.

The 382 mothers who had donated milk for a period less than 30% of their period of hospital stay were considered as defaulters. We excluded 17 mothers due to refusal of consent or absence of patient information in the case records and finally enrolled 217 mothers in present study. (Fig 1. Study flow chart).

Thus, the prevalence of Human milk donors among the total population in HMB was 71.29% (616/864) and prevalence of regular donors was 27.08% (234/864). The 44.21% (382/864) were defaulters in present study. We studied the sociodemographic and clinical profile of these regular donors and their infants in present study. Among

the donors who made regular donations adolescent (2.76%) and elderly (1.84%) lactating mothers were minority in number. Two thirds of women were from urban area (61.75%). Majority of them were Hindus (54.83%) reflecting the distribution in the general population.

Donors who belonged to minority religions like Christianity (21.19%) and Islam (18.43%) had also donated to the bank in considerable numbers. One fourth of the donors (24.88%) were employed during the antenatal period to support their families economically. 80% of regular donors were educated. Many donors (65.43%) had undergone up to school education and approximately one seventh (9.21%) of them were illiterates. Professionals constituted only 1.38% of the donor population.

The socioeconomic status of the donors was determined using the Modified Kuppusamy Socioeconomic status Scale revised for 2016 which was based on the education and occupation of the head of the family and the monthly income of the family.¹¹ Donor mothers largely belonged to the middle class (91%). There were not many donors from the upper class (0.92%). Half of the study population had more than 2 living children (Table 1).

Table 1: Demographic profile of milk donors (N=217).

Variables	Category	n	(%)
Maternal age (years)	<18	6	2.76
	18-24	31	14.26
	25-35	176	81.11
	>35	4	1.84
Residence	Urban	134	61.75
	Rural	83	38.25
Religion	Hindu	119	54.83
	Christian	46	21.19
	Muslim	40	18.43
	Others	12	5.53
Maternal Occupation (Antenatal period)	Employed	54	24.88
Maternal education	Illiterate	20	9.21
	School	142	65.43
	College	52	23.96
	Professional	3	1.38
Socio-Economic status of family (kuppusamy scale - class)	Upper	2	0.92
	Upper middle	83	38.24
	Lower middle	113	52.07
	Upper lower	19	8.76
	Lower lower	0	0
Family size (no. of live children)	1	46	21.19
	2	117	53.91
	≥3	54	24.88

One third of the donors were primi mothers (30.86%). Majority of them had undergone more than 4 antenatal

checkups (92%) and delivered vaginally (62.67%) in a health facility offering level II neonatal NICU care (42.86%). Fifteen percent of the donors had delivered at home (15.21%). The regular donors had stayed in the hospital with their sick infants for a mean (SD) period of 13 (4.21) days. The mean (SD) Post-natal age of commencement of milk donation among the donors who made regular donation to the bank was 9 (3.47) days. (Table. 2)

Analysing the demographic and clinical data of the donors' infants, we found that most of the regular donors had delivered males (58.06%) and very low birth weight infants (42.86%). Most of the infants (53.46%) of the donor population had growth retardation during the intrauterine period (SGA).

Table 2: Natal and postnatal profile of milk donors (N=217).

Variables	Category	n	(%)
Parity	Primiparous	67	30.86
No. of antenatal check ups	1-3	17	7.83
	4-7	154	70.97
	>7	46	21.19
Mode of delivery	Vaginal	136	62.67
	Cesarean section	81	37.32
Place of delivery	Primary level	33	15.21
	Secondary level	93	42.86
	Tertiary level	54	24.88
	Home	33	15.21
	Others	4	1.84
	Anaemia	163	75.12
Complications	Gestational diabetes	27	12.44
	Pregnancy induced hypertension	87	40.09
	Post-partum hemorrhage	23	10.59
Postnatal age at commencement of milk donation (days)		9 (3.47) *	
Duration of maternal hospital stay with the infant (days)		13 (4.21) *	
Breast feeding		189	87.09

*: Mean (standard deviation)

Large for their gestational age infants (LGA) were eight percent (8.76%). The infants of 32 donors died during the study. The infant mortality among the donor population

was 14.75%. The infants of the donor mothers were in the hospital for a mean (SD) duration of 18 (6.86) days. (Table.3), (Figure. 2)

Table 3: Infant characteristics of donor mothers (N=217).

Variables	Category	n	(%)
Gestational age (weeks)	<34	42	19.35
	34-37	45	20.74
	38-41	115	52.99
	>41	15	6.91
Infant sex	Males	126	58.06
	Females	91	41.94
Order of birth	First	41	18.89
	Second	54	24.88
	Third	98	45.16
	Above third	24	11.06
Birth weight (grams)	<1000	27	12.44
	1000-1499	59	27.19
	1500-2499	93	42.86
	≥2500	41	18.89
Intra uterine growth status	AGA	82	37.89
	SGA	116	53.46
	LGA	19	8.76
Duration of infant hospital stay mean (SD) days		18(6.86)	
Infant mortality		32	14.75

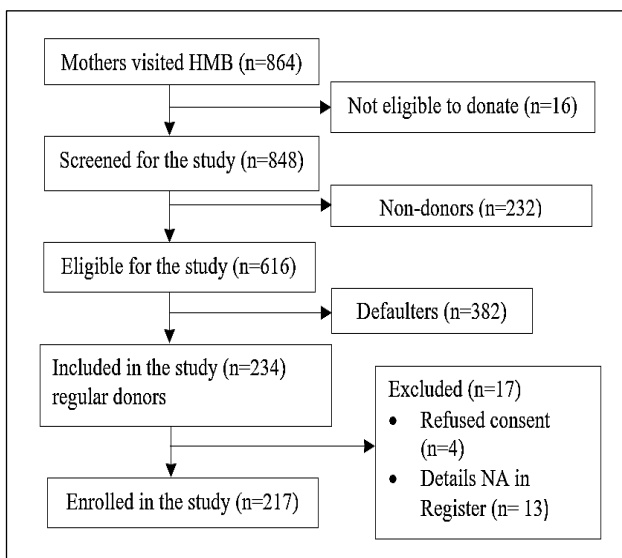


Figure 1: The flow during the study.

DISCUSSION

Present study was conducted in the Model Human milk Bank situated in our tertiary level III NICU. This bank receives milk donations from the postnatal mothers whose infants have been admitted in the NICU during their hospital stay and from lactating mothers who visit

our Postnatal clinics and review OPDs. Our NICU is an extramural unit which caters to approximately 150 monthly admissions of sick neonates referred from all over the state and neighboring states like Andhra Pradesh and Karnataka for both acute and chronic illnesses. This study was mainly undertaken to study the socio demographic profile and clinical profile of the lactating mothers who stayed motivated and made regular milk donations during their stay in the hospital. Though the prevalence of human milk donors in our hospital was 71%, the prevalence of regular donors was only 27% in the study. From the previous literature we learn that human milk donation depends on biological environment that promotes milk production and a social context that includes the donor's education, political beliefs, culture and economic circumstances, all of which can support or interfere with a women's motivation to become a donor and to continue donating over time.¹² The occurrence of these variables in our donor population remain largely unexplored in our country and present study attempted it in our region.

It is believed that apart from Psychological factors like the attitudes and behaviors, emotions, cultural, religious and social beliefs, physiological factors like parity, health and nutritional status, delivery mode and complications, length of hospital stay with the infant during treatment and early expression to donate may also influence milk production and thereby donation process. These have not been studied by the previous researchers.³⁻⁹ The morbidity patterns and mortality of donors' infants determine the duration of their hospital stay and thereby maternal proximity to HMB for regular milk donation. Hence it is also said to psychologically influence milk production and donation.⁹ We profiled these important unexplored factors to boost sustained milk donation by donors to the HMB.

The Adolescent donors indicate the low number of primiparous women among the regular donors. This may be related to the need of assistance for feeding and assurance of the mothers about the characteristics of their milk, its quantity and quality. While women with another previous child have lived through it before, primiparous women often lack confidence. We also have meagre numbers in the elderly group (>35 year) probably due to physiological or increased incidence of complications causing lactational failure. The customs in certain religions like Islam and Catholic have prohibited donation and acceptance of Donor Human milk for their children causing difficulty in establishing HMBs in those countries.¹³ In present study we had regular donations from donors who belonged to these religions bringing out the diversified religious beliefs across nations. Our research reports that women who had some form of education, economically secure family with more than one living child donated milk on regular basis to our HMB. This is not contradicting to other studies on characters of milk donors.^{3,4,8} The operative deliveries delay the mothers in joining their sick infants at our

extramural unit and thereby their hospital stay with their infant is shorter. So late commencement of breast feeding, and donation limit the numbers of regular donors among cesarean mothers. The breast-feeding rates in present study was very high (87%) compared to national statistics (46%). This could be due to our policy of exclusive breast milk feeding in our unit. Our healthcare personnel motivate mothers to pump milk to stimulate lactation which could have probably led to increased expression and early commencement of both breast feeding and breast milk donation and thereby increased breast feeding rates.

Previous Research works on human milk bank donation did not study about the health status or the morbidity patterns of the donors' infants.^{3,9} Present study was unique in reporting on the clinical profile of these infants which could have had an influence on the maternal physiological and psychological aspects of milk production and donation. The average duration of hospital stays of regular donors with their infants (11 ± 3.4 days) and their infants (18 ± 7.2 days) was higher than our unit average stay of infants (7 days). This probably reflects an association between regular donation and longer hospital stay. Fair to believe that in our part where no home collection of donor milk is undertaken, the proximity of HMB during the hospital stay and sustained motivation by health personnel and peer groups in the hospital made more number of regular donors among this chronic population. Thus, mothers of preterm, VLBW and SGA infants, infants with chronic illnesses demanding prolonged stay in the hospital were donors who contributed to the bank regularly. These mothers should be motivated to sustain their donation and improve on their quantity and also for peer group motivation.

Strength and limitations

Present study was the first one to study and report on the socio demographic characteristics of Human milk donors in the country. Present study was a single centre study done with good number of donors methodologically robust to report on the prevalence of Human milk donors in HMB population. We studied the maternal and their infants' clinical profile to see their distribution in regular human milk donors. These factors found to have high prevalence among regular donors could be employed in strategies adopted to increase new donor recruitment and sustain their donation. A comparison of distribution of variables which influence milk production and donation among the regular donors and the nondonors (controls) would have brought out the factors which would be statistically significant factors. Our research did not study about the defaulters in the donor population. Since many variables influence milk donation a descriptive study for hypothesis generation was a felt need in this area. Future research works should be designed with analytical comparisons between donors and their controls.

We grouped the donors based on their donation days and not on their quantity of milk donation. Prolonged hospital stays, and chronically sick infants may have decreased donation amount. Thus, we have not differentiated mothers with high lactational output from others. Strategies to improve milk donation would require efforts to identify these donors and motivate them to sustain donation. An important population to examine in future research are the defaulters who are eligible and intend to donate but do not follow through on their donation. The efforts to compare the regular donors with the defaulters rather than the mere controls in future would be more beneficial to motivate and sustain donors.

CONCLUSION

The prevalence of human milk donors in our HMB population was 71.29%. The prevalence of regular donors among the HMB population was 27.08%. Only one third of them donated regularly. We reported descriptive statistics on various social and demographic variables and the clinical profile of these regular donors and their infants who were able sustain their milk donation. Though the prevalence of Human Milk Donors is high among the lactating mothers visiting HMB, only one third of them donate regularly.

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