

Exclusive Breastfeeding and Assisted Reproductive Technologies: A Calgary Cohort

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Abstract

Objectives: To determine if there is a difference in exclusive breastfeeding rates between mothers who conceived spontaneously compared with those who conceived using Artificial Reproductive Technology (ART).

Study methods: A prospective cohort study ("All Our Babies") of pregnant women was conducted in Calgary, Alberta, Canada from May 2008-May 2010. Participants completed three written questionnaires, two during pregnancy and one at four months postpartum. Data for this analysis included all participants who used ART to conceive the pregnancy, and a 2:1 random selection of women who conceived spontaneously. ART included use of fertility enhancing drugs and/or artificial insemination and/or in vitro fertilization +/- intra cytoplasmic sperm injection. Descriptive statistics were used to characterize the population. Chi square tests, Fisher exact tests and t-tests were used to assess differences between groups.

Results: Seventy-six participants (5.9%) used some form of ART to conceive. Mothers in the group who used ART to conceive were older than the group who conceived spontaneously ($p=0.001$). At four months post-partum 54.1% of infants who were conceived via ART were exclusively breastfed compared to 59.7% of infants who were spontaneously conceived ($p=0.99$). No significant differences in terms of breastfeeding initiation ($p=0.60$), breastfeeding at 4 months postpartum ($p=0.20$) or breastfeeding difficulties ($p=0.65$) were found between women who conceived spontaneously and women who conceived through ART.

Conclusion: This study suggests that mothers who conceive using ART do not differ from those who conceived spontaneously in terms of breastfeeding initiation, duration or likelihood of difficulty. This suggests that specialized counseling for these mothers is not required in regards to breastfeeding and these mothers can be reassured that using ART to conceive will not impact their breastfeeding practices.

Keywords: Breastfeeding; Artificial reproductive technologies; In vitro fertilization

Abbreviations: AOB: All Our Babies; IVF: In vitro Fertilization; ICSI: Intra Cytoplasmic Sperm Injection; BMI: Body Mass Index; IVF-ET: In vitro Fertilization and Embryo Transfer

Introduction

Infertility affects approximately 10-15% of the reproductive age population [1]. Mothers with infertility problems have a different path to conception compared with those who are able to conceive spontaneously. This path can be costly and involve significant emotional strain [1]. It is unclear if this differing path to conception has an impact on the rates of breastfeeding among these mothers. It has been shown that anxiety late in pregnancy has been associated with a shorter duration of breastfeeding in the ART population [2].

The World Health Organization, the Canadian Paediatric Society, Health Canada and the Public Health Agency of Canada all recommend exclusive breastfeeding until 6 months of age [3-5]. A recent study demonstrated that while rates of breastfeeding initiation in Canada are high (90.3%), rates of exclusive breastfeeding at 6 months post partum are just 13.8% [3]. Breastfeeding is important to child health; it has been shown to decrease gastrointestinal, respiratory and ear infections, and to possibly offer protection against atopic disease for the infant [6].

Factors that positively influence breastfeeding initiation and duration include: maternal age greater than 25, higher level of education, having higher socioeconomic status, living with a partner, having a prior pregnancy, lower pre-pregnancy BMI and having a home birth [3-5]. Living in the Northern territories and Western provinces of Canada has also been associated with an increased likelihood of exclusive breastfeeding at six months of age [3]. Factors associated with failure to

breastfeed include smoking during pregnancy, Caesarean birth, infant's admission to neonatal intensive care unit, introduction of a pacifier and maternal return to work before 6 months post partum [3-5]. The ART population are characterized by older maternal age and higher level of education [2], which are positive influences on breastfeeding. However, the ART population has also been associated with being first time mothers and an increased likelihood of Caesarean section [2], which have been associated with failure to breastfeed. Hence, it is unclear if fertility treatments have an influence on breastfeeding.

Given the importance of breastfeeding for child health and conflicting results in the international literature on the association between ART and breastfeeding, this study attempted to answer the following question in a Canadian context. "At 4 months postpartum is there a difference in exclusive breastfeeding rates between mothers who conceived naturally compared with those who conceived using some form of ART?" Understanding if there are unique needs among women who conceive with ART would allow for tailored counselling of mothers in regards to the importance of breastfeeding and further identifying

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Received April 17, 2012; Accepted April 21, 2012; Published April 25, 2012

Citation: O'Quinn C, Metcalfe A, McDonald SW, Raguz N, Tough SC (2012) Exclusive Breastfeeding and Assisted Reproductive Technologies: A Calgary Cohort. Reproductive Sys Sexual Disord S5:002. doi:10.4172/2161-038X.S5-002

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any modifiable barriers to breastfeeding. Alternatively, failing to demonstrate a difference would allow for reassurance of patients about breastfeeding concerns and allocation of scarce educational and intervention resources to other areas.

Methods

The All Our Babies (AOB) study is a prospective community-based observational cohort designed to understand health service utilization and the influence of maternal health on long-term infant and maternal outcomes. Pregnant women were recruited from prenatal clinics, Calgary Laboratory Services, posters and word of mouth in the community. Women were eligible to participate if they were able to communicate in English, were accessing prenatal care in Calgary and were less than 24 weeks pregnant at the time of recruitment. Women were asked to complete three written questionnaires - one prior to 24 weeks of gestation, one between 34 and 36 weeks of gestation, and one at 4 months post-partum. A fourth questionnaire "preterm version" was used as a substitute for the second questionnaire (34-36 weeks gestational age) for any women who delivered before 34 weeks gestational age. Data was collected from May 2008 to May 2010.

Overall, 1654 women participated in the AOB cohort with a

Assisted Reproductive Technology	N (% , 95% CI)
Fertility-enhancing drugs only	24 (31.6, 20.9-42.3)
Fertility-enhancing drugs and invasive procedure(s) (AI, IUI, IVF, ICSI, embryo transfer, etc.)	27 (35.5, 24.5-46.5)
Invasive procedure(s) (AI, IUI, IVF, ICSI, embryo transfer, etc) only	25 (32.9, 22.1-43.7)

AI: artificial insemination; IUI: intrauterine insemination; IVF: in vitro fertilization; ICSI: intracytoplasmic sperm injection

Table 1: Type of Assisted Reproductive Technologies Used (n=76).

retention rate of 81%. Individuals with multiple gestation pregnancies and who did not complete questionnaire 1 (included data on method of conception) and questionnaire 3 (included data on infant feeding practices) were excluded from this analysis, leaving an eligible sample of 1296 women.

Data from all participants who used ART to conceive the pregnancy was included (n=76). ART included the use of fertility enhancing drugs and/or artificial insemination and/or in vitro fertilization +/- intra cytoplasmic sperm injection (ICSI). As only 76 women conceived with the help of ART, a comparison group of women with spontaneously conceived pregnancies were randomly selected from the AOB cohort on a 2:1 basis to avoid type one errors.

Descriptive statistics were used to characterize the population. Chi square tests and t-tests were used to assess differences between groups (Fisher Exact Tests were used for categorical variables if any cell contained less than 5 individuals).

Results

Approximately six percent (5.9%) of participants used some form of medical intervention to conceive the pregnancy (Table 1). Participants in this study tended to be married, have completed a university degree, and have an annual household income greater than \$60,000 (Table 2). Women who conceived using ART were significantly older than women who conceived spontaneously (p=0.001). No statistically significant differences were found between the randomly selected comparison group and the members of the AOB cohort who were not selected for this study (Table 2).

Almost all women in this sample attempted breastfeeding (ART:

Variable	ART N=76 N (% , 95% CI)	Spontaneous Concep- tion N=152 N (% , 95% CI)	p-value (comparison of ART and Spontane- ous conception)	Remainder of AOB cohort N=1,068 N (% , 95% CI)	p-value (comparison of sponta- neous conception and remain- ing AOB cohort)
Annual Household Income					
<\$60,000	5 (6.9, 1.0-12.9)	23 (15.8, 9.8-21.7)	0.07	198 (19.1, 16.7-21.5)	0.33
≥\$60,000	67 (93.1, 87.1-99.0)	123 (84.2, 78.3-90.2)		837 (80.9, 78.5-83.3)	
Graduated from trade school/college/university					
Yes	54 (71.1, 60.7-81.4)	122 (80.3, 73.9-86.6)	0.12	818 (76.7, 74.2-79.3)	0.33
No	22 (28.9, 18.6-39.3)	30 (19.7, 13.3-26.1)		248 (23.3, 20.7-25.8)	
Currently working or attending school					
Yes	51 (67.1, 56.4-77.8)	91 (62.8, 54.8-70.7)	0.52	632 (60.2, 57.2-63.2)	0.55
No	25 (32.9, 22.2-43.6)	54 (37.2, 29.3-45.2)		418 (39.8, 36.8-42.8)	
Maternal Age at Delivery					
Mean (standard deviation)	32.9 (5.2)	30.8 (4.5)	0.001	30.8 (4.2)	0.90
Range	23-43	20-45		19-42	
Born in Canada					
Yes	54 (71.1, 60.7-81.4)	119 (78.3, 71.7-84.9)	0.23	821 (76.9, 74.4-79.5)	0.71
No	22 (28.9, 18.6-39.3)	33 (21.7, 15.1-28.3)		246 (23.1, 20.5-25.6)	
Ethnicity					
Caucasian	55 (72.4, 62.2-82.5)	122 (80.3, 73.9-86.7)	0.18	811 (76.2, 73.7-78.8)	0.27
Non-Caucasian	21 (27.6, 17.5-37.8)	30 (19.7, 13.4-26.1)		253 (23.8, 21.2-26.3)	
Marital Status					
Single, Separated, Divorced, Widowed	2 (2.6, -1.0-6.3)	6 (4.0, 0.8-7.1)	0.72	63 (5.9, 4.5-7.3)	0.33
Married, Common Law	74 (97.4, 93.7-101.0)	145 (96.0, 92.9-99.2)		1002 (94.1, 92.7-95.5)	
First Pregnancy					
Yes	45 (59.2, 48.0-70.4)	94 (62.2, 54.5-70.1)	0.66	668 (62.6, 59.7-65.5)	0.93
No	31 (40.8, 29.6-52.0)	57 (37.7, 29.9-45.5)		399 (37.4, 34.5-40.3)	

Table 2: Participant Characteristics.

Variable	Mode of Conception		p-value
	ART N=73 N (% , 95% CI)	Spontaneous N=150 N (% , 95% CI)	
Initiated breastfeeding within 24 hours of delivery	72 (97.3, 93.6-101.0)	139 (93.3, 89.2-97.3)	0.21
Successfully breastfed on first attempt	53 (71.6, 61.2-82.0)	108 (73.0, 65.8-80.2)	0.83
Able to breastfeed prior to hospital discharge	60 (89.6, 82.1-97.0)	126 (89.4, 84.2-94.5)	0.97
Consulted a lactation consultant	30 (41.1, 29.7-52.5)	62 (43.1, 34.9-51.2)	0.78
Infant was exclusively breastfed in the first week	38 (51.4, 39.8-62.9)	88 (59.1, 51.1-67.0)	0.23
Infant was exclusively breastfed in the past week	40 (54.1, 42.6-65.5)	89 (59.7, 51.8-67.7)	0.99
Infant currently receives some breast milk	53 (71.6, 61.2-82.0)	119 (79.3, 72.8-85.9)	0.20
Experienced any breastfeeding difficulties	67 (88.2, 80.8-95.5)	137 (90.1, 85.3-94.9)	0.65
Difficulties with the baby (problems latching, sleepy baby)	41 (53.9, 42.6-65.3)	72 (47.4, 39.4-55.4)	0.35
Discomfort (swollen breasts, sore nipples, painful breasts)	49 (64.5, 53.6-75.4)	102 (67.1, 59.6, 74.6)	0.69
Difficulty breastfeeding (insufficient milk, flat/inverted nipples)	27 (35.5, 24.6-46.4)	44 (28.9, 21.7-36.2)	0.31
Tired	38 (50.0, 38.6-61.4)	64 (42.1, 34.2-50.0)	0.26

Table 3: Infant Feeding Practices (among women who attempted breastfeeding).

97.3%, 95% CI: 93.6-101.0 versus spontaneous conception 98.7%, 95% CI: 96.9-100.5 (p=0.60)). Data was not collected on infant feeding practices if women did not attempt to breastfeed. At four-months postpartum, there was no difference in exclusive breastfeeding in the past week between women who used ART to conceive and women who spontaneously conceived (51.4% 95% CI: 42.6-65.5 versus 59.7% 95% CI: 51.8-67.7) (Table 3). Furthermore, no statistically significant differences were seen between women who used ART to conceive and women who spontaneously conceived in any of infant feeding practices studied (Table 3).

Two sensitivity analyses were conducted - one using the entire All Our Babies cohort as the comparison group (to see if this sub-study was underpowered to detect a statistically significant difference) and the other using only women who had used an invasive form of ART (to see if women who only used fertility enhancing drugs were diluting the impact of invasive forms of ART). In both cases, no statistically significant differences were found (data not presented but available upon request).

Discussion

This study did not demonstrate any significant differences between the medical intervention group and the spontaneous conception group in regards to breast feeding practices. The rates of exclusive breastfeeding at four months postpartum, 51.4% and 59.7%, were less than those previously reported by McMahon, et al. [7] of 68.8% in a group of women who conceived via in vitro fertilization with embryo transfer (IVF-ET) and 74.6% in the control group, and similar to those reported by Hammarberg, et al. [2] of 46% and 57.3% respectively. The reported rates of exclusive breastfeeding at four months postpartum were higher than the reported Canadian national rates at six months postpartum (13.8%) [3]. While we cannot predict what the rates would have been at six months postpartum the four month data is promising.

The literature on breastfeeding following ART is conflicting and primarily comprises small samples. One Australian cohort of 166 consecutive women, who conceived with ART, found that one third of participants did not initiate breastfeeding or breastfed for less than 6 weeks. The proportion exclusively breastfeeding at three months (45%) was less than the Australian national average of 62% [6]. Another Australian cohort study had opposing results showing that women who conceived using ART were more likely to initiate breastfeeding 89% vs. 83.3%, although by 3 months post-partum a smaller proportion were exclusively breastfeeding 46% versus 57.3% compared with the general population of childbearing Australian women [2].

Similar to our results, several other studies have shown no difference between women who conceived spontaneously versus those who conceived through ART. A Belgian study found no difference in breastfeeding initiation and duration between naturally conceived, ICSI or IVF conceived pregnancies [8]; while a case series of six mothers who conceived using ovum donation found no increase in breastfeeding difficulties [9]. McMahon, et al. [7] also found no difference in breastfeeding outcomes when comparing primiparous women in Australia with no history of infertility and those who had IVF-ET.

There are several limitations to our study; the participants for this study were recruited from the community, and may have had a differing path to conception and pregnancy experiences from those not participating. Given we were analyzing data collected from a community based sample the proportion of women who used ART to conceive was smaller than if we had recruited women from an infertility clinic; however, this reflects the conception experiences of the community and enabled a comparison with a community based sample of pregnant women. This study does not reflect experiences of women in the Calgary area who are unable to complete a written questionnaire in English. There may also be bias as all measures were self-reported. However, the questionnaires were developed with the assistance of an infertility specialist and breastfeeding experts and used a standardized validated tool to assess breastfeeding experiences [10]. In the future, it is recommended that studies assesses the infant feeding practices between same sex couples as well as to consider if there were any maternal medical conditions that affected the breastfeeding experiences as there was insufficient data to examine either of these groups in sufficient detail in the current study.

This study provides insight into the breastfeeding practices among the ART population in Alberta. It is also the first of its kind to look at breastfeeding and infertility in a Canadian context. Our findings suggest that the ART population is not different from mothers who conceive spontaneously with regard to breastfeeding practices or experiences. This information can be used to reassure patients and also to allocate resource to another focus.

Acknowledgements

Conflicts of interest: The authors have no conflicts of interest to report. All authors have participated in the research and/or article preparation. The final manuscript has been approved by all authors.

Ethical approval: This study received ethical approval from the Conjoint Health Research Ethics Board at the University of Calgary.

Funding

The "All Our Babies" study was funded by the Preterm Birth and Healthy Outcomes Team, an Alberta Innovates - Health Solutions Interdisciplinary Team Grant (#200700595) team grant (Preterm Birth and Healthy Outcomes Team) (PI: Suzanne Tough). Amy Metcalfe holds a Canadian Institutes of Health Research Doctoral Award in Genetics (Ethics, Law and Society) and a CIHR Strategic Training Initiative in Health Research Studentship in Genetics, Child Development and Health. Sheila McDonald holds a post-doctoral fellowship award from the Alberta Centre for Child Family and Youth. Suzanne Tough holds a Senior Scholar from Alberta Innovates Health Solutions.

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This article was originally published in a special issue, [Invitro Fertilization](#) handled by Editor(s). Dr. Zhongjie Shi, Thomas Jefferson University, USA