# Maternal Factors Influencing the Decision to Breastfeed Newborns Conceived with IVF

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# Abstract

Objectives: The breastfeeding initiation rate is extremely disparate worldwide and remains low in France, with a breastfeeding initiation rate of 60.2%. Some studies have reported increased early parenting difficulties in women who conceived with in vitro fertilization (IVF). Our study had two main objectives: (1) to determine by a retrospective chart review the demographic and medical factors associated with breastfeeding versus formula feeding in women who had undergone IVF and (2) to assess by survey study the reasons for the infant feeding decision (breastfeeding versus formula feeding) for women who conceived by IVF.

Subjects and Methods: By telephone interviews, we conducted a longitudinal nonexperimental cohort study of French women who had a live birth after IVF. Fertility data and obstetric outcomes were collected from individual medical records.

Results: Among women who had a live birth after IVF (n=73), 63% (n=46) initiated breastfeeding for a mean duration of  $6.2\pm6.2$  months. In our IVF population, the breastfeeding initiation rate was similar to that in the general French population. The following three factors were found to have a significant negative influence on breastfeeding initiation: duration of infertility greater than 2 years, cesarean delivery, and history of formula feeding when the women themselves were newborns.

Conclusions: Long duration of infertility and history of cesarean delivery after IVF negatively influenced the breastfeeding initiation rate. For this subgroup of patients, postpartum care should be enhanced to support the early mother–baby relationship and promote breastfeeding.

# Introduction

**E** XCLUSIVE BREASTFEEDING OF NEWBORNS for a minimum of 6 months is recommended by the World Health Organization.<sup>1</sup> The breastfeeding initiation rate is extremely disparate worldwide, with a rate reaching approximately 99% in Norway, Denmark, and Japan,<sup>2</sup> 90% in Germany,<sup>3</sup> and 74.6% in the United States.<sup>4</sup> In France, the rate of exclusive breastfeeding has increased from 37% in 1972 to 60.2% in 2010 but remains low compared with other countries. In France, 2.7% of newborn babies are delivered by assisted reproductive technologies (ART).<sup>5</sup> This population of newborns, even the singletons, seems more exposed to obstetrical complications and adverse perinatal outcomes, with higher rates of cesarean delivery, preterm delivery, low birth weight, and perinatal mortality.<sup>6</sup>

In cases of ART success, most couples seem to have high levels of satisfaction and marital benefit with strengthened partner relationships.<sup>7</sup> However, infertility and ART might also have adverse effects on maternal self-esteem and life satisfaction. Some authors have described a subgroup of infertile patients who might be more vulnerable to these adverse effects after experiencing infertility and ART.<sup>8</sup> Indeed, Fisher et al.<sup>8</sup> showed more early parenting difficulties, such as breastfeeding difficulties and anxiety, in women who conceived with ART. Monti et al.9,10 underlined the greater anxiety and emotional vulnerability of women from the ART population, with an increased risk of depression and possible consequences on the mother-baby relationship. Although their study had several methodological limitations, Allen et al.<sup>6</sup> recommended further research concerning the psychosocial impact of ART.

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Breastfeeding initiation is associated with many factors, such as maternal attitude toward breastfeeding, maternal age, education level, and sociodemographic and cultural factors, such as workplace environment and smoking status.<sup>11–14</sup> Donath and Amir<sup>15</sup> showed that maternal motivation is a stronger predictor of breastfeeding than typical demographics factors, and a prenatal maternal intention to breastfeed represents the strongest factor influencing the initiation and duration of breastfeeding.<sup>16</sup> However, the early postpartum period is also a key period for mother–baby emotional attachment and initiation of breastfeeding.

Our study had two main objectives: (1) to determine by a retrospective chart review the demographic and medical factors associated with breastfeeding versus formula feeding in women who had undergone in vitro fertilization (IVF) and (2) to assess by survey study the reasons for the infant feeding decision (breastfeeding versus formula feeding) for women who conceived with IVF.

## **Subjects and Methods**

We conducted a retrospective longitudinal cohort study of mothers with newborns conceived by IVF and IVF– intracytoplasmic sperm injection (ICSI) performed between January 4, 2011 and December 24, 2011 in our ART Center (Hôpital de la Conception, Marseille, France) and born between September 20, 2011 and September 23, 2012. Only pregnancies after fresh embryo transfers were included in this study because it is not currently known whether pregnancy with cryopreserved embryos has maternal psychological consequences or specific influences on maternal attitudes toward breastfeeding. Inclusion criteria were defined in an attempt to study a more homogeneous IVF population.

Each year in France, all ART centers must report all medical and laboratory data concerning ART activities of the previous year (n-1) to the Agence de la Biomédecine, which is an agency overseen by the French Minister of Health.<sup>5</sup> Before each ART procedure, patients are asked for written informed consent that their medical data might be used for national statistical analysis, and in our IVF unit, couples give their written consent before ART procedures for the possibility of anonymous retrospective analysis. Each year, a midwife calls every couple who conceived with IVF during the year (n-1) to enquire about pregnancy outcome and to collect neonatal data. At the end of the year 2012, patients were invited to participate in our study in a structured telephone interview. Patients were free to refuse participation. Informed consent for a retrospective review of patient files was obtained from each patient as part of the regulatory process of our institution, and this was validated by the local ethical board.

Descriptive demographic data and pregnancy outcome were collected from individual medical records. After conducting a review of research on factors that influence breast-feeding, <sup>11–14,17,18</sup> we designed a survey concerning newborn feeding decisions.

All medical data were anonymous. The data recorded were as follows:

 Characteristics of patients: age at delivery, body mass index, smoking status, and socioprofessional category according to the following PCS-2003 classification<sup>19</sup>: Category 1, farmers; 2, tradesmen, shopkeepers, and business owners; 3, managers and secondary/university teachers; 4, intermediate professions; 5, white collar workers; 6, blue collar workers; 7, retired persons; and 8, no professional activity.

- Characteristics of infertility: etiology and duration of infertility prior to pregnancy, parity, history of first trimester pregnancy losses (early miscarriage and ectopic pregnancy), legal termination of pregnancy, number of previous live births, and number of IVF attempts.
- Pregnancy outcome: singleton or multiple, mode of delivery, and birth weight. We used standard international definitions for the following obstetric outcomes: preterm labor, premature rupture of fetal membranes, pregnancy-induced hypertension, gestational diabetes mellitus, placental abruption, and week of delivery.

The telephone interview concerning the choice of newborn feeding asked each mother about the following:

• The newborn feeding decision: breastfeeding or formula feeding, mother's prenatal infant feeding intention, how the mother was fed when she was a newborn, the reasons that influenced her choice, and partner and family support. Breastfeeding mothers were also asked about duration of breastfeeding and reasons for stopping breastfeeding.

## Statistical analysis

Statistical analysis was performed with SPSS (PASW Statistics version 17.0) software (SPSS, Inc., Chicago, IL). The results are presented as the mean  $\pm$  SD values. We used Student's *t* test to compare the means of quantitative variables between the "breastfeeding" and "formula feeding" groups. Because the number of patients with formula feeding was low (n=27), the alternative nonparametric Mann–Whitney test was also used for quantitative variables with clear deviation from normality or when the observed variance was too dissimilar between the two groups. The chi-squared test was used to compare qualitative variables between the two groups, and Fisher's exact test was used when at least one expected frequency was less than 5. The results were considered significant for p < 0.05.

#### Results

#### Characteristics of the study population

During the study period, we performed 596 cycles of IVF and 471 fresh embryo transfers, yielding a live birth rate per fresh transfer of 18.9%. In total, 89 women had a live birth after IVF (n=55) and IVF–ICSI (n=34) during the study period. Of these, 14 women were lost to follow-up after relocation and/or change of telephone number, and two women declined to participate in the study. Therefore, 73 women who agreed to participate and to answer the oral telephone survey were included in the study.

The mean age at delivery was  $32.7 \pm 4.5$  years after a mean duration of infertility of  $3.1 \pm 2.4$  years. Concerning socioprofessional categories, no woman was in category 1, 48% of women were in categories 2–4 (n=35), 27% were in categories 5 and 6 (n=27), and 15% were in category 8 (n=11). Length of infertility was greater than 2 years for 59% of patients (n=43). A live birth occurred in 82% of cases (n=60) after the first or second IVF attempt. Eight-one percent of IVF pregnancies were singletons (n = 59), and 19% were twins (n = 14).

Among IVF pregnancies, 40% (n = 29) had complications, with 31% of women (n = 23) hospitalized for one or more of the following gestational complications, which could be associated each other: preterm labor (14%, n = 10), ante-partum hemorrhage/placenta previa (14%, n = 10), gestational diabetes mellitus (10%, n = 7), intrauterine growth restriction (n = 3), premature rupture of fetal membranes (n = 1), pregnancy-induced hypertension (n = 2), and obstetric cholestasis (n = 1).

Delivery occurred at  $38 \pm 2$  gestational weeks with a cesarean section rate of 42% (n=31). Among 87 newborns, premature birth (<37 gestational weeks) occurred in 14% of cases (n=10). Mean newborn weight was  $2,952\pm622$  g, and 20% of newborns weighed less than 2,500 g (n=17). Hospitalization in the neonatal care unit was required for 18% of the newborn babies (n=16), but there were no maternal hospitalizations in the intensive care unit.

#### Comparison of the breastfeeding group versus the formula feeding group

Among women who gave birth after IVF, 63% (n=46) chose breastfeeding. The mean duration of breastfeeding was  $6.24 \pm 6.21$  months, and the median was 4 months, with a range of 2 weeks to 24 months. In the study population, 46 women were breastfed as newborns. Among them, 76% chose breastfeeding (n=35), and this rate was significantly higher than the breastfeeding rate (41%) of the women who were formula-fed as newborns (n=27) (p=0.03). Table 1 details and compares the characteristics of women who chose breastfeeding versus those who chose formula feeding. A duration of infertility greater than 2 years was significantly associated with formula feeding (p=0.002). There was an increased but nonsignificant association between smoking status and formula feeding (p = 0.06). Cesarean delivery was significantly associated with a lower rate of breastfeeding (p=0.04). No differences were found between the formula feeding group and the breastfeeding group for socioprofessional category, marital status, gynecologic history, infertility etiology, IVF laboratory technique ("classical" IVF vs. ICSI), or number of IVF attempts.

# Maternal reasons influencing the decision of newborn feeding

The choice of newborn feeding was decided for 93% of women (n=68) before pregnancy, for 6% during pregnancy (n=4), and for 2% after delivery (n=1). There were many possible responses in the survey concerning reasons for the choice to breastfeed; 80% of women chose breastfeeding for its health and nutritional benefits (n=37), 67% for the mother-baby relationship (n=31), 22% for the positive experience expected (n = 10), 17% for economic reasons (n = 8), and 15% for the feeling of obligation to breastfeed their newborns (n=7). The duration of breastfeeding was less than 1 month for 6.5% of patients (n=3), between 1 and 3 months for 39% (n = 18), between 3 and 6 months for 22% (n = 10), between 6 and 12 months for 21.5% (n = 10), and longer than 12 months for 11% (n=5). The reasons why women stopped breastfeeding included the difficulty of breastfeeding and the ease of formula feeding for 41% of the women (n=19),

TABLE 1. COMPARISONS OF IN VITRO FERTILIZATION PATIENT CHARACTERISTICS BETWEEN THE BREASTFEEDING GROUP AND THE FORMULA FEEDING GROUP

		Formula	
	Breastfeeding	feeding	
	(n = 46)	(n=27)	р
Age (years)	$32.9 \pm 4.7$	$32.3 \pm 4.4$	0.59
Marital status			0.11
Married	35 (76)	16 (59)	
Living common law	11 (24)	11 (41)	
Socioprofessional category <sup>a</sup>			0.57
2-4	24 (52)	11 (41)	
5 and 6	15 (33)	12 (44)	
8	7 (15)	4 (15)	
BMI $(kg/m^2)$	$24.17 \pm 4.6$	$24.3 \pm 4.9$	0.88
Primiparity	31 (67)	18 (67)	0.57
Miscarriage/ectopic	8 (17)	5 (18)	0.57
pregnancy			
History of legal	5 (11)	3 (11)	0.97
termination of pregnancy		- ( )	
Active smoking	7 (15)	9 (33)	0.06
Duration of infertility			$0.002^{b}$
<2 years	25 (54)	5 (19)	
$\geq 2$ years	21 (46)	22 (81)	
Cause of infertility			0.99
Male factor	23 (50)	13 (48)	
Female factor	11 (24)	7 (26)	
Mixed	4(9)	2(7)	
Unexplained	8 (17)	5 (19)	
Number of IVF cycles			0.14
1-2	40 (87)	20 (74)	
≥3	6 (13)	7 (26)	
Pregnancy			0.33
Singleton	38 (83)	21 (78)	
Twins	8 (17)	6 (22)	
Hospitalization	18 (39)	11 (41)	0.54
during pregnancy			
Gestational weeks			0.20
at delivery			
<37	8 (17)	2 (7)	
≥37	38 (83)	25 (93)	
Mode of delivery	· /	. /	$0.04^{b}$
Vaginal delivery	31 (67)	11 (41)	
Cesarean section	15 (33)	16 (59)	
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Data are mean ± SEM values or number (%) as indicated.

<sup>a</sup>Defined by the PCS-2003 classification system.

 ${}^{b}p < 0.05$  indicated a significant difference.

BMI, body mass index; IVF, in vitro fertilization.

generalized weakness for 35% (n=16), stress for 22% (n=10), returning to work for 20% (n=9), and medical reasons for 15% (n=7). The reasons given by the 27 women who chose formula feeding were the lack of desire to breastfeed for 45% (n=12), fear of insufficient lactation for 37% (n=10), the choice to enhance the father–baby relationship for 33% (n=9), the idea that breastfeeding could alter breast esthetics for 22% (n=6), and the desire to share the responsibility of newborn feeding for 7% (n=2).

## Discussion

To our knowledge, we are the first to study the factors influencing the choice between breastfeeding and formula feeding in a population of newborns conceived by ART. Despite the possible bias and confounding of a retrospective study, our results found three factors that seem to influence the decision to breastfeed in our ART population: length of infertility, mode of delivery, and the type of feeding received by the patient when she was a newborn.

In France, the rate of exclusive breastfeeding is 60.2%,<sup>20</sup> which is quite similar to the rate in our study (63%). Unfortunately, it was difficult to determine the exact breastfeeding behavior of our study population because we performed a retrospective study conducted after the mother had stopped breastfeeding. We included newborns conceived between January 4, 2011 and December 24, 2011 and born between September 20, 2011 and September 23, 2012. We conducted our structured telephone interviews at the end of 2012 for the earlier births and beginning of 2013 for the latest births. The objective of this delay was to determine how long mothers breastfeed, but this delay induced memory and recall biases, especially concerning degree of formula supplementation. Furthermore, an interview about breastfeeding behavior could also introduce a social desirability bias. When breastfeeding was preponderant in the newborn regimen, we considered that the newborn had the benefits of maternal breastfeeding and included the infant in the breastfeeding group for analysis.

The breastfeeding rate was surprisingly and significantly lower when the duration of infertility was greater than 2 years. Indeed, 81% of formula-feeding mothers had infertility of greater than 2 years. In IVF pregnancies, parents often have a high degree of investment and anxiety because pregnancy is desired longer and is much more difficult to obtain. A history of long duration of infertility and ART might induce anxiety, depression, and loss of self-esteem, and these adverse effects can persist despite pregnancy and live birth.<sup>22</sup> However, our study is only a hypothesis-generating study and provides no data to support the hypothesis that the subgroup of infertile patients who we described is at risk of depression. The mother-baby relationship is most likely different after a long history of infertility, but there is a lack of wellconducted studies in this field; to this end, further research is warranted with a well-conducted design for a case-controlled prospective cohort.

The relationship between breastfeeding and psychosocial support has been documented,<sup>14</sup> and, in particular, the influence from partner and family has been found to be important. Our results showed that the breastfeeding initiation rate was significantly higher in women with a history of breastfeeding from their mothers. Indeed, Ekström et al.<sup>23</sup> suggested that the influence of the grandmother could be helpful in supporting breastfeeding in her granddaughter.

In our study, 31% of patients had a pregnancy with prenatal hospitalization. However, the rate of twins (19%) was 12 times higher than in case of spontaneous pregnancy (1.5%). Many studies have reported higher obstetrical complications in pregnancies obtained from ART, even for singleton pregnancies.<sup>6,24,25</sup> After IVF, the increase in antenatal and obstetric complications may have an indirect impact on the mother–baby relationship. Dudas et al.<sup>26</sup> showed that unfavorable obstetric outcomes induce antepartum depressive symptoms (adjusted odds ratio = 1.42). Similar to the results of Scott et al.,<sup>18</sup> we observed that cesarean birth significantly decreased the chance of breastfeeding; conversely, 74% of newborns who were delivered vaginally were breastfed.<sup>18</sup>

difficult to acquire after ART because of stigmatization by the infertile identity and anxiety during pregnancy, with some mothers delaying preparation of childbirth (nursery, attending classes). However, that author underscored the limitations of analysis inherent in empirical studies.

#### Conclusions

In accordance with the international World Health Organization recommendations, France should increase its breastfeeding initiation rate through supportive maternity practices<sup>28</sup> and social measures. In the ART population, the prevalence of breastfeeding was similar to that in the French general population. However, a subpopulation of women who gave birth after IVF seem at risk of having a lower breastfeeding initiation rate and most likely need to receive increased postpartum support for the establishment of the mother-baby relationship, breastfeeding initiation, and adjustment to motherhood. Clinicians should focus support on women with risk factors of anxiety or loss of self-esteem. In our study, three factors were found to have a significant negative influence on breastfeeding initiation after IVF: duration of infertility greater than 2 years, cesarean delivery, and history of formula feeding when the women themselves were newborn. Obstetricians, midwives, and nurses should provide special attention to IVF pregnancies; these care providers should take into account the specific aspects of childbearing in women who conceived by ART, including the mothers' infertility history, the mothers' need for support, and the increased risk of obstetrical adverse effects on pregnancies and birth, which could negatively influence postpartum adjustment.<sup>27,29</sup>

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No competing financial interests exist.

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