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KNOWLEDGE AND ATTITUDES TOWARD BREASTFEEDING AMONG MOTHERS CONCEIVING VIA ASSISTED REPRODUCTIVE TECHNOLOGY VS NATURAL PREGNANCY; A RESEARCH STUDY

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ABSTRACT

Background and Aims: With advancements in assisted reproductive technology (ART), the increasing birth rate is to be expected. The present study aims to assess breastfeeding attitude and knowledge among mothers with different modes of conception.

Methods: A case-control study was conducted among 60 postpartum breastfeeding mothers, including 31 with ART pregnancies and 29 with natural pregnancies. Participants completed standardized questionnaires assessing breastfeeding knowledge and attitude, and final scores were compared between the groups to evaluate the influence of conception type.

Results: A significant positive correlation was observed between knowledge and attitude scores ($r=0.584$, P value <0.001). The mean knowledge score did not differ significantly between the case (146.5 ± 5.2) and controls (152.9 ± 19.4 ; P value $=0.114$), whereas the mean attitude score was higher in the ART group (47.7 ± 5.3) compared with the control group (44.9 ± 5.0 ; P value $=0.050$). When scores were dichotomized at the median, fewer ART mothers had knowledge scores above the threshold (30.8% vs. 72.2%; $\chi^2=7.33$, P value $=0.007$), while a greater proportion had attitude scores above the median (52.0% vs. 25.9%; $\chi^2=3.72$, P value $=0.050$).

Conclusion: The results of the present study showed a significant correlation between maternal knowledge and attitude. Although ART mothers showed slightly higher positive attitudes toward breastfeeding, their knowledge levels were not significantly different from mothers with natural pregnancy. Our findings are preliminary and require larger scale and multicentric confirmation.

Keywords: Breastfeeding, Knowledge, Attitude, Assisted Reproductive Technology, Natural Pregnancy

1 INTRODUCTION

Breastfeeding should commence within the first hour after birth and continue for the first six months (as exclusive breastfeeding). Along with continued breastfeeding, nutritionally-adequate and safe complementary foods can be introduced after six months (1, 2, 3).

Generally, breastfeeding decisions are made before childbirth. Proper breastfeeding practice is affected by many factors such as intention, knowledge, and attitude. It is reported that mothers' knowledge and practice about breastfeeding are suboptimal (4, 5), and could be advanced by parents' research, training, consultation, and previous experiences (6, 7).

With advancements in assisted reproductive technology (ART), the increasing birth rate is to be expected. ART pregnancies may associated with low birth weight, preterm birth, and delivery complications (8). Evidence has also shown that women with ART conception potentially face more difficulties like stress, anxiety, and a bad feeling that adversely affect breastfeeding (9). It was reported that breastfeeding intention and discontinuation in women with different mode of conception were the same; however, sub-fertile or infertile women were forced to introduce a formula due to difficulties and shorter exclusive breastfeeding period (10). The shorter breastfeeding duration may also be due to the increased risk of preterm or multiple birth through ART conceiving (11). In contrast to this evidence, an investigation demonstrated that mothers with assisted conception wish to breastfeed, and early cessation may result in a feeling of guilt and failure (12). Another study showed that breastfeeding duration was mainly associated with access to information, commercial promotion, and breastfeeding support, rather than the mode of conception (13).

According to the world health organization (WHO) report, the performance of mothers regarding breastfeeding is a function of their awareness, attitude, and support (7); however, studies from different societies indicate that mothers do not adequately care about this issue. Furthermore, about 5 million infertile women seek ART and in vitro fertilization (IVF) technique to become pregnant (14). The existence of evidence showing breastfeeding practice, attitude, and knowledge among this population is so limited and the available results are conflicting (15, 16).

1.1 Objectives

Up to our knowledge, there is no investigation from Iran reporting breastfeeding attitude and knowledge among mothers undergoing ART procedure. So, the present study aimed to assess breastfeeding attitude and knowledge among mothers with different modes of conception. We hypothesized that ART mothers may have different attitude and knowledge levels.

2 METHODS

A case-control study was carried out at Yas Hospital Complex, affiliated with the Tehran University of Medical Sciences (Tehran, Iran, 2023).

Post-partum breastfed mothers were recruited during the first 48 hours after neonates' birth, using simple sampling. Exclusion criteria were neonatal prematurity, severe anomalies, neonate hospital admission, multiple gestations or maternal physical and mental complications with breastfeeding contraindication. Mothers with previous experience in health-related professions or education were excluded, as well.

Participants were categorized into two groups based on their mode of conception: the case group (ART pregnancy) and the control group (natural pregnancy). Sixty mothers; 31 as the cases and 29 as the controls entered the study. Prior to enrolment, all participants were fully informed about the study and provided written consent.

Mothers' demographic and obstetrical data including age, education, type of conception, gestational age, numbers of gravidity, type of delivery, any history of underlying or perinatal complications were collected and recorded. The history of any training regarding breastfeeding was also asked by the participants. Neonatal data composed of sex, birth weight, type of feedings was extracted from medical records and collected.

Assessing maternal knowledge and attitude regarding breastfeeding, a questionnaire was implemented based on the knowledge breastfeeding questionnaire (17) and the Iranian Version of Iowa Infant Feeding Attitude Scale (IIFAS) (18). IIFAS final score >70 was considered positive attitude and higher final scores of knowledge questionnaire showed more knowledge toward breast feeding.

IIFAS and knowledge breastfeeding questionnaire composed of 17 and 53 items, respectively with a scale range of 1 to 5 showing strong disagreement to strongly agree options.

IIFAS was implemented by previous studies as a reliable and validated questionnaire, but knowledge of breastfeeding questionnaire had not been validated in our country. So, the research team determined the validity of the questionnaire before implementation by using forward-backward translation technique. In summary, the questionnaire was firstly translated in Persian by a neonatologist and a Persian English translator. Then, the translated questionnaire was revised by a pediatrician. The final version was approved by three individuals. The next step was translation of the Persian file to English by an English translator who was blind regarding the original questionnaire. The original questionnaire and the English-translated one were evaluated by the research team and were reviewed regarding their conformity to approve the validity of the Persian version. Assessing the reliability of the questionnaire as the next step, Cronbach's test with $\alpha = 0.81$ was used to approve internal consistency. Regarding external reliability, mothers were asked to respond to breastfeeding knowledge questionnaire with a one-week interval. Using the Intraclass correlation coefficient test (ICC), reliability coefficient was calculated at 0.715. Then, to determine face and content validity, the content validity ratio (CVR) was used. This was first implemented by Lawshe in 1975 (19). Accordingly, the Persian-translated version of the questionnaire was sent to eight of neonatology professors from Tehran University of Medical Sciences (Tehran, Iran) to report their opinions. The experts were asked to declare their views regarding each item of the questionnaire by using one of the following options: either beneficial or necessary; beneficial but not necessary; neither beneficial nor necessary. According to experts' opinion, CVR for each item was calculated above 0.75, which was approved.

2.1 Sample size and data collection

Prior to the main study, a pilot test was conducted on a small group of mothers to assess feasibility and estimate the effect size. The pilot indicated a large effect size (Cohen's $d \approx 0.75$), which was used for a prior power calculation, confirming that the final sample ($N=90$; ~ 30 per group) provides approximately 80% power to detect between-group differences.

Assessing knowledge and attitude, the participants were asked to complete the questionnaire. The completed questionnaires were gathered, and the final scores related to mothers' breastfeeding knowledge and attitude were calculated separately. As a primary outcome, final scores of questionnaires were compared between the case and control groups to determine the influence of the type of conception on knowledge and attitude levels.

2.2 Data Analysis

Data were analyzed using SPSS version 26. Descriptive data were presented in frequency and Mean (SD). Analysis of data was performed using independent samples t-test, and Pearson correlation, with P values ≤ 0.05 considered statistically significant. Normality of continuous variables was assessed using the Kolmogorov-Smirnov test, complemented by inspection of mean, median, standard deviation, skewness, and kurtosis. The results confirmed approximate normal distribution of the data; therefore, parametric tests (independent samples t-test and Pearson correlation) were applied for group comparisons and correlation analyses. Continuous variables are presented as mean $\pm$ SD, and 95% confidence intervals were calculated for group comparison. P values ≤ 0.05 were considered as the significant levels.

2.3 Ethical Consideration

The present study was approved by the Ethics Committee of Tehran University of Medical Sciences (IR.TUMS.CHMC.REC.1400-283). All experiments were also performed in accordance with relevant guidelines and regulations. Written informed consent was obtained from all participants.

3 RESULTS

Of 60 mothers, 18 mothers (30%) had a higher diploma degree and 6 (10%) were unemployed. Of all mothers, 23 (38.3%) had a history of underlying disease (thyroid disorders and diabetes) and 47 (78.3%) had planned pregnancies while 13 subjects (21.7%) had unwanted pregnancies. The mode of delivery in 50 participants (83.3%) was cesarean section. Of all multipara mothers, 25 (41.7 %) had previous breastfeeding experience and 10 mothers (16.7%) fed their infants by formula. Concerning breastfeeding training, 21 mothers (35.0%) did not receive any training, while the others had received breastfeeding-related training from different sources including previous experience (1.7%), mass media (34.1%), virtual training (7.5%), and in-person education through consultation with doctors and medical staff (21.7%). Comparing demographic factors between the groups, the results demonstrated that low level education (P value=0.008), unwanted pregnancy (P value=0.02), history of breastfeeding (P value < 0.001), and receiving breastfeeding training (P value=0.004) in the control group were significantly higher than the case group. While

cesarean section and having a male neonate in the case group were more frequent than the controls (P value<0.05). Detailed data related to both groups are shown in Table 1.

According to the analyses of the results, there was a significant and positive correlation between knowledge and attitude values (P value<0.001; Correlation Coefficient=0.584) showing that mother with higher knowledge had higher attitude levels regarding breastfeeding.

As the results of analyses are shown in Table 2, the mean knowledge score in the ART group was 146.54 ± 5.16 (95% CI: 144.70–148.38), compared with 152.94 ± 19.36 (95% CI: 145.92–159.96) in the control group ($t = -1.61$, P value= 0.114). The mean attitude score in the ART group was significantly higher; 47.68 ± 5.27 (95% CI: 45.81–49.55), compared with 44.93 ± 5.01 (95% CI: 43.09–46.77) in the control group ($t = 1.93$, P value= 0.050).

Participants' knowledge scores were divided into two groups based on the median (149.16) value: those above the median and those below the median. A chi-square test was conducted to compare the knowledge scores between the case group and the control group. In the case group, 30.8% of participants (n=8) had knowledge scores above the median, while in the control group with natural pregnancy, this figure was 72.2% (n=13). The chi-square test revealed a significant difference in knowledge scores between the ART and natural pregnancy groups (P value=0.007, $\chi^2 = 7.33$).

Similarly, participants' attitude scores were also categorized into two groups based on the median value (48.0). A chi-square test was performed to compare the attitude scores between the case group and the control group. In the case group, 52.0% of participants (n=13) scored above the median for attitudes, compared to 25.9% (n=7) in the natural pregnancy group. The chi-square test indicated a significant difference in attitude scores between the two groups (P value=0.050, $\chi^2 = 3.72$).

Table 1: Demographic data in the case and control groups

Variable	Case group (N=31)	Control group (N=29)	Test statistic (P value)
Nulligravida (n, %)	5(16.12)	7(24.13)	$\chi^2 = 0.42$ (0.517)
Education $\leq$ diploma (n, %)	17(54.83)	25(86.20)	$\chi^2 = 7.02$ (0.008)
Employment (n, %)	25(80.64)	29(100.0)	$\chi^2 = 2.97$ (0.085)
Gestational age (weeks, mean $\pm$ SD)	37.07 $\pm$ 1.80	37.59 $\pm$ 2.13	$t = -1.03$ (0.315)
Unwanted pregnancy (n, %)	3(9.67)	10(34.48)	$\chi^2 = 5.43$ (0.020)
Maternal systemic disease (n, %)	13(41.93)	10(34.48)	$\chi^2 = 0.35$ (0.550)
Cesarean section (n, %)	30(100)	20(68.96)	$\chi^2 = 8.34$ (0.004)
Breastfeeding training (n, %)	17(54.83)	22(75.86)	$\chi^2 = 8.15$ (0.004)
Neonate birth weight (g, mean $\pm$ SD)	2718.33 $\pm$ 702.84	3207.60 $\pm$ 510.15	$t = -1.47$ (0.147)
Neonate gender; male (n, %)	18(58.06)	11(37.93)	$\chi^2 = 6.27$ (0.012)
History of breastfeeding (n, %)	10(32.2)	15(71.4)	$\chi^2 = 10.0$ (< 0.001)

Table 2: Comparison of mean scores related to mothers' knowledge and attitude in the case and control groups

Variable	Group	Mean $\pm$ SD	95% CI	t-value	P value
Knowledge	Case	146.54 $\pm$ 5.16	144.70 to 148.38	-1.61	0.114
Knowledge	Control	152.94 $\pm$ 19.36	145.92 to 159.96		
Attitude	Case	47.68 $\pm$ 5.27	45.81 to 49.55	1.93	0.050
Attitude	Control	44.93 $\pm$ 5.01	43.09 to 46.77		

4 DISCUSSION

This study, as the first investigation assessed the influence of conception type (ART versus natural) on maternal knowledge and attitudes toward breastfeeding.

The result showed a positive correlation between breastfeeding knowledge and attitude, indicating that knowledge could enhance attitudes and behaviors regarding breastfeeding. This finding may suggest that educational interventions, targeting breastfeeding knowledge have a dual benefit of improving attitude. It should be also noticed that the rate of ART pregnancies is increasing worldwide (14) which may result in an increased rate of birth complications like prematurity. Considering more practical attention and training measures regarding knowledge and attitude of ART mothers are crucial to improve breastfeeding practice leading to a higher survival rate of such vulnerable neonates.

According to the results, despite no notable difference in levels of breastfeeding knowledge between the groups, mothers in the ART group demonstrated significantly more positive attitudes toward breastfeeding than their counterparts with natural pregnancies. Furthermore, the results of the present study showed that more participants in the case group could score above the median for attitudes compared with the participants in the natural pregnancy group. These results may relate to several contributing factors like psychological variables. Mothers with ART pregnancies are more highly engaged with healthcare services before and during pregnancy than mothers with natural pregnancy; these communications provide more medical supervision, and educational opportunities resulting in correction the misconceptions related to breastfeeding (20, 21). Similarly, the significantly higher attitude scores in the case group delineated a likely heightened commitment to breastfeeding. Based on the evidence, mothers who receive fertility treatment are older, nonsmoker, with higher education and income levels. These factors can significantly improve breastfeeding initiation (11). Additionally, according to our findings, mothers with natural conception need more measures and interventions to enhance their attitudes toward breastfeeding. Comparing the results with prior studies, we could not find any study that compared the levels of knowledge and attitude toward breastfeeding in mothers with different types of conception. But there are several investigations, reporting that ART mothers tend to have greater engagement with infant care practices, including breastfeeding (12, 22, 23). This overprotective behavior may arise from their strong desire for breastfeeding and compensating for their emotional complications, caused by their infertility.

Based on the results, significantly more participants in the control group had knowledge scores above the median compared to the participants with ART pregnancy. This finding may relate to significant differences in various demographic, obstetric, and breastfeeding-related factors between the two groups. According to the results, higher educational status, breastfeeding training courses, and experience of breastfeeding were observed in participants of the control group. Confirming our results, Ghanaei et al. showed significant associations between breastfeeding knowledge and experience of breastfeeding or maternal education (4). Additionally, several studies underscores that breastfeeding challenges may be more prevalent among ART mothers due to psychological and obstetrical factors such as low self-esteem or lack of self-efficacy, prolonged infertility period, cesarean delivery, and preterm birth (15, 24). Studies have also pointed to reasons beyond maternal factors like maternity care strategies, governmental legislation, socio-cultural practices, health care providers, hospital (in where neonates were born), and its breastfeeding-supportive measures that may affect breastfeeding knowledge and outcomes in women undergoing assisted reproductive techniques (16, 25, 26). An investigation showed that women with IVF pregnancies had less information about breastfeeding compared to those with ovum donation technique (13); however this comparison regarding the types of ART was not made in our study.

According to the results, a notable proportion of mothers in the case group had not received breastfeeding-related training despite their higher inclination towards breastfeeding. This finding shows the paramount of importance regarding educational interventions that should be targeted ART mothers specifically, ensuring they receive adequate support and information to translate their positive attitudes into effective breastfeeding practices.

It should be noticed that some P values in our results are borderline (P values=0.05 were also considered statistically significant); that requires cautious in interpretation. Focusing on knowledge and attitude toward breastfeeding, particularly among mothers with natural pregnancy is needed. The results of other investigation also indicated the necessity of intervention programs in maternity health care centers. This program should contain breastfeeding counseling for health care providers and subsequently for childbearing mothers (27). The present study has other limitations. The sample size was small that limited the statistical power of the findings. The investigation was not a multicentric study. As both groups were belonged to the same population and hospital, the results might not be generalized to other population with different socioeconomic status. We could not evaluate the impact of further variables related to different source populations or hospitals (fathers' characteristics or types of hospitals) to generalize the results. Additionally, we did not consider different types of assisted reproductive techniques like intra uterine

insemination or various forms of in vitro fertilization, to compare the results. The lack of confounder adjustment like education, delivery mode, or prior experience, reliance on self-reported questionnaires, and absence of longitudinal follow-up were the other limitations. The results are preliminary; further investigations with larger sample sizes, multicentric design, and including more variables can provide more comprehensive data.

List of abbreviations

- ART: assisted reproductive technology
- IVF: in vitro fertilization
- IIFAS: the Iranian Version of Iowa Infant Feeding Attitude Scale
- CVR: content validity ratio.

5 CONCLUSION

The results of the present study showed a significant correlation between maternal knowledge and attitude. Although ART mothers showed slightly higher positive attitudes toward breastfeeding, their knowledge levels were not significantly different from mothers with natural pregnancy. Our findings are preliminary and require larger scale and multicentric confirmation.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare that there is no conflict of interest.

Statement of ethical approval

The present study was approved by the Ethic Committee of Tehran University of Medical Sciences (IR.TUMS.CHMC.REC.1400-283).

Statement of informed consent

Written informed consent was obtained from the participants for publication of this study. *Availability of data and materials*

Authors' contributions

Dr. K.K., Dr. S.D., and Dr. M.Z. carried out the design and coordinated the study. Dr. M.Z., Dr. R.M., Dr. M.V, Dr. M.K. participated in most of the experiments, and prepared the manuscript. Dr. L.S carried out the analyses of data, and interpreted the results. The authors read and approved the content of the manuscript.

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