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Effect of postpartum clinical guideline on maternal outcomes in iranian women: a randomized controlled clinical trial

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Abstract

Background The postpartum period is a vital time for women, infants, spouses, parents, caregivers and families. Considering the importance of postpartum care and the necessity of using comprehensive and up-to-date clinical guidelines in Iran, this study was designed to implement a indigenized clinical guideline in Iran on maternal outcomes, including maternal functioning, postpartum depression and postpartum specific anxiety (primary outcomes) as well as infant care, maternal health problems, experiencing violence, feeding method and contraception use (secondary outcomes).

Methods This randomized controlled trial was conducted with 272 postpartum women in Taleghani and Alzahra hospitals in Tabriz in 2023. Participants were randomly allocated to intervention and control groups. The intervention group received care and training based on clinical guideline while the control group received routine care and training. Both groups were followed up by telephone at the second and sixth week after delivery. Questionnaires assessing maternal health problems and postpartum depression were completed in the second and sixth weeks and while assessments of maternal functioning, postpartum depression, postpartum specific anxiety, infant care behavior, and experiences of violence were conducted in the sixth week after delivery. ANCOVA, independent-t tests, and Mann-Whitney U tests were used for data analysis.

Results There was no significant difference between the two groups regarding of socio-demographic characteristics ($P < 0.05$). Additionally, there were no significant differences in the mean score of maternal functioning, anxiety, depression, infant care behavior or experiences of violence after the intervention between the intervention and control groups based on ANCOVA or Mann-Whitney U tests ($P < 0.05$). However, the rate of infant formula use was significantly lower in the intervention group (12.9%) compared to the control group (23.4%) ($P = 0.027$). In terms of contraceptive methods used, 24.3% of the intervention group and 22.2% of the control group reported using reliable contraceptive methods)$P = 0.035$(. Furthermore, 98.5% of participants in the intervention group expressed satisfaction with the education and recommendations provided, compared to 88.2% in the control group ($P = 0.002$).

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Conclusion Providing clinical guideline-based care was associated with increased breastfeeding rates, greater use of reliable contraception methods, and higher levels of maternal satisfaction. However, it did not have a significant impact on other maternal outcomes.

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Keywords Clinical Guideline, Maternal functioning, Postpartum specific anxiety, Postpartum Depression, Infant care

Background

The postpartum period is typically defined as the first 6 weeks after childbirth [1]. During this time of learning and adaptation to baby care, mothers are also at risk of experiencing physical and psychological complications [2]. Postpartum complications can have long-term consequences. According to the World Health Organization (WHO), more than one-third of women experience long-term physical problems [3]. A recent study published in The Lancet Global Health highlighted the significant burden of long-term maternal health complications resulting from childbirth, finding that at least 40 million women worldwide are likely to experience such issues. These include pain during sexual intercourse (dyspareunia) (35%), back pain (32%), anal incontinence (19%), urinary incontinence (8–31%), anxiety (9–24%), depression (17–11%), perineal pain (11%), fear of childbirth (tocophobia) (6–15%) and secondary infertility (11%) [4].

Postpartum care should be provided to all women during this critical period. Adequate resources, along with evidence-based and respectful care from trained providers, are essential. Ensuring optimal physical, emotional, and psychological outcomes requires health systems to adopt a human rights-based approach that goes beyond merely averting maternal mortality and morbidity, but emphasizing person-centered care and well-being [5]. In Iran, postpartum care is delivered by various professionals, including midwives, obstetricians, general practitioners, pediatricians and nurses, across multiple settings such as public or private hospitals, clinics and especially delivered by midwives in health centers located in underserved areas. Currently, there are no facilities and infrastructure for providing home care, and such services have not yet been implemented [6].

Ideally, all postpartum providers should adhere to the same clinical guidelines to ensure that standard and high-quality care is delivered to all women and infants after childbirth, regardless of their location or available services [7]. Within the framework of primary care for women and infants following childbirth, evidence-based guidelines can mitigate mid- and long-term complications by promoting effective care. Furthermore, these guidelines can influence by providing recommendations on clinical management, they may also have an impact on policy levels by providing recommendations on clinical management, ensure continuity of care and standardization across sectors and healthcare professions [1]. The Institute of Medicine defines clinical guidelines as "statements that include recommendations to optimize patient care, developed through systematic reviews of evidence and evaluations of the benefits and harms of alternative care options" [8]. Despite the high prevalence of long-term health complications among postpartum mothers, these conditions have been largely overlooked in research, clinical practice, and policy. In a review of scientific literature over the past 12 years revealed a lack of high-quality guidelines for effectively treating 40% of the 32 prioritized postpartum conditions [4].

The WHO and the UK's National Institute for Health and Care Excellence (NICE) have recently published updated postpartum care guidelines [1, 9]. The WHO postnatal guideline, encourages developers of national, sub-national, and facility-level guidelines to adapt WHO recommendations for local implementation while considering workforce capacity, healthcare system, demographics, and sociocultural expectations [1]. Both WHO and NICE provide valid and comprehensive clinical guidelines for postpartum care based on the latest scientific evidence and rigorous methodology for the care of mothers and their babies during the first six to eight weeks after birth [1, 9].

The WHO emphasizes that postpartum care must be adequately resources to ensure a positive postpartum experience and safe care [1]. Studies indicate that women report lower satisfaction with postpartum care compared to prenatal and childbirth care. A survey of 1,260 nulliparous mothers in the UK found that more than half of mothers did not receive sufficient help or education to breastfeed, one in five did not receive the necessary care; and one in seven lacked adequate information regarding their educational needs [12]. Research on satisfaction with postpartum care underscores the need for individualized support, effective information delivery, and emotional assistance [10]. Meeting individual needs is crucial for satisfaction with care. Most dissatisfaction has been reported in studies focusing on aspects such

as the physical environment of postpartum wards, staff interactions, emotional support, communication quality, supervision levels, breastfeeding support, and parental education [11].

Unfortunately, in Iran, the postpartum care, despite its sensitivity, is often less attention by healthcare providers and midwives compared to pregnancy care, both qualitatively or quantitatively [12]. Researches indicate that only 30% of mothers in developing countries receive adequate postpartum care, conversely, studies show that approximately 70% of mothers in Iran express dissatisfaction with quality of postpartum services provided [13, 14]. Common concerns reported during the postpartum period include insufficient information provision, education on self-care practices, support systems after discharge from hospitals [15], as well as limited research on the effectiveness of postpartum education and care intervention [16, 17].

Early detection of postpartum complications can aid in reducing maternal mortality rates by identifying potential issues before they escalate into life-threatening situations [18]. This can be achieved through effective follow-up procedures post-delivery that involve monitoring adherence to current evidence-based clinical guidelines. The proposed guidelines specifically addressed components beyond standard care including maternal healthcare interventions: mental health support, physical activity recommendations, schedules for postnatal contacts (three additional visits), newborn care: whole-body massage, early childhood development strategies, evaluation for health systems prior to discharge from the health facility, home visits for postnatal follow-ups, continuity of midwifery care, task sharing components in postnatal care delivery, involvement of men in maternal health initiatives, home-based records, and digital communication targeting clients.

This study aims to implement a clinical guideline for postpartum care in Iran focusing on maternal outcomes including maternal functioning, postpartum depression and anxiety specific (primary outcomes) and infant care, maternal health problems, experiencing violence, feeding method and contraception use (secondary outcomes). We hypothesized that implementing adapted postpartum clinical guidelines would significantly improve maternal health outcomes among Iranian mothers. Specifically, we expected to see reductions in rates of postpartum depression and anxiety, enhancements in maternal functioning, increased satisfaction with the information received, improved feeding methods, and higher rates of contraception use, compared to standard routine care among Iranian mothers.

Methods

Study design and participants

This study was a randomized controlled clinical trial with two parallel groups, receiving approval from the Ethics Committee of Tabriz University of Medical Sciences under the assigned Ethics Code (IR.TBZMED.REC.1401.661). Additionally, the trial was registered with the Iranian Registry of Clinical Trials under the code IRCT20120718010324N76. The study included a total of 272 postpartum women admitted to Taleghani and Alzahra hospitals, both affiliated with Tabriz University of Medical Sciences.

Inclusion criteria consisted of mothers who had either vaginal delivery or cesarean section with healthy full-term newborns, single pregnancy, and a minimum of primary education literacy. Exclusion criteria included mothers with infants admitted to the neonatal intensive care unit)NICU (or neonatal care unit, any recent adverse events such as the loss of loved ones or divorce within the last three months, and a postpartum depression inventory score of 13 or higher. Additionally, chronic diseases such as cardiovascular diseases, chronic hypertension, diabetes, and thyroid conditions in the mother were also considered as exclusion criteria.

Participants were recruited for the study over an eight-month period, from April to November 2023. A total of 320 mothers were initially sampled for the study, out of which 48 were excluded: 8 for having a depression score exceeding 13, 20 due to underlying maternal conditions, 18 because their newborns required hospitalization in NICU, and 2 declined to participate. Subsequently, 272 mothers were randomly allocated to two study groups. At the end of the study, the intervention group had 4 participants who discontinued their participation: 2 due to the father's death, 1 due to the neonate's one-month hospitalization for seizures, 1 person due to preventing spouse from continuing to cooperate in the project. In the control group, there were 9 dropouts (6 individuals due to not responding to their own or their spouse's phone calls, 1 individual due to the spouse's refusal to continue participating in the project, and 2 individuals withdrew from participation). A total of 132 individuals in the intervention group and 127 individuals in the control group were followed up and analyzed until the end of the study (see Fig. 1).

Sample size

The sample size in this study was calculated based on three primary outcomes: maternal functioning, postpartum- specific anxiety, and postpartum depression using the G-Power software. According to a study by Gholizadeh Shamasbi et al. [19], for maternal functioning ($M_1=97.4$, $M_2=116.9$ with a 20% assumed increase due to the intervention), $SD_1=SD_2=12.9$; Two-sided $\alpha=0.05$;

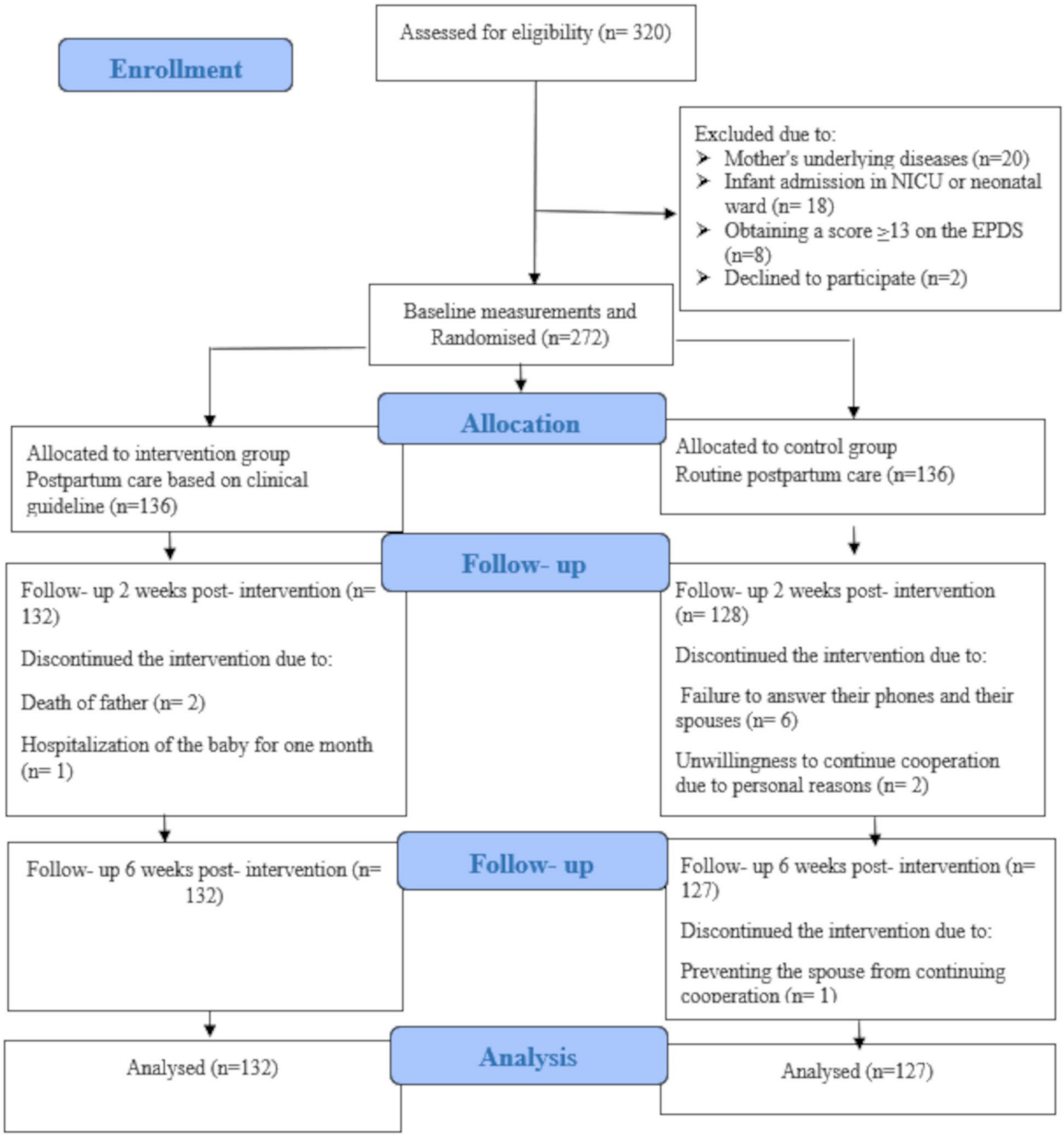

Fig. 1 The study flowchart

and Power=95%, the sample size for each group was calculated to be 13. With a 10% drop-out rate, the final sample size for each group was considered to be 14 individuals. Additionally, based on the results of the study by Mirghafourvand et al. [20] regarding specific postpartum anxiety (M_1=14.28, M2=11.42 with a 20% assumed decrease due to the intervention), $SD_1=SD_2=8$; Two-sided $\alpha=0.05$; Power=80%, the sample size was calculated as 124 individuals per group. With a 10% drop-out rate, this resulted in a final sample size was of 135 individuals per group.

For postpartum depression (M_1=13.52, M2=10.81 with a 20% assumed decrease due to the intervention), $SD_1=SD_2=5.81$; Two-sided, $\alpha=0.05$; Power=95%, based on Ahmadi et al. [21], the sample size was calculated 121 for each group. With a 10% drop-out rate, this resulted in a final sample size of 135 individuals per group. Since the calculated sample size was highest for postpartum

specific anxiety, the final sample size was determined to be 136 individuals in each group.

Sampling

The researcher visited the postpartum ward and conveniently selected samples from mothers who had vaginal or cesarean deliveries. Comprehensive explanations regarding the research objectives and methods were provided to interested mothers. Informed written consent was obtained from those who agree to participate. Participants were assured the confidentiality regarding their information and anonymity in reporting results. Socio-demographic details, obstetric characteristics, and the Edinburgh Postnatal Depression Scale questionnaire were completed.

Randomization and allocation concealment

Participants were assigned to study groups using a stratified random blocking method based on parity status and delivery type. Block sizes of 4 and 6 were utilized with a 1:1 allocation ratio. To ensure allocation concealment, intervention types were written on paper and placed in consecutively numbered opaque sealed envelopes. Following informed consent acquisition and completion of basic specifications, envelope were opened to administered interventions. Randomization and allocation concealment was carried out by the corresponding author, while the first author conducted the intervention. Due to the nature of the intervention, blinding researcher and participants was not feasible; however, data collectors remained blinded by having questionnaires related to the postpartum stage were completed by the research assistant. The data were analyzed by a researcher who had been blinded to the study groups.

Intervention

After participants were allocated to the study groups, clinical guideline recommendations were provided to those in the intervention group by a midwifery Ph.D. student researcher. These recommendations included educational guidance on maternal self-care, neonatal care, nutrition, mobility, identification of maternal and neonatal risk signs, breastfeeding, neonatal massage practices, neonatal jaundice assessments, contraceptive options, and supplement usage. The intervention consisted of one face-to-face educational session conducted in the hospital lasting approximately 15 min for direct interaction on key topics related to maternal and neonatal health. To maintain continuous communication with mothers for up to six weeks post-delivery, a group called 'The Mothers' was created on Rubika's virtual network that included all participants from the intervention group. This approach facilitated follow-up education sessions while ensuring accountability through clinical guideline recommendations provided via counseling on topics, such as breastfeeding support, nutrition advice, supplementation guidance, neonatal care strategies for physical or mental health issues. The researcher addressed mothers' concerns during hospital visits when necessary and made referrals as needed for neonatologists, gynecologists, or psychiatrists when specialized examination or mental/physical health issues arose. The researcher assumed responsibility for addressing all postpartum issues for a period of up to six weeks, offering solutions based on clinical guideline recommendations through the Rubika group, telephone consultations, and face-to-face interactions with both mothers and fathers in the intervention group.

The guidelines specifically addressed components beyond standard care including maternal care; mental health interventions; physical activity recommendations; schedules for postnatal care (three postnatal contacts); newborn care practices such as whole-body massage; early childhood development strategies; health systems evaluation criteria prior to discharge after birth, home visits for postnatal follow-ups; continuity of midwifery care; task sharing components of postnatal care delivery; involvement of men in maternal health initiatives; home-based records, digital communication targeting client. Mothers in the control group received standard care along with routine postpartum education based on hospital protocols.

Both intervention and control groups underwent follow-up via telephone at the second and sixth weeks post-delivery. Questionnaires pertaining to maternal health problems and postpartum depression were administered during the second and sixth weeks, while an infant care behavior, anxiety, maternal functioning, and experiences of violence were assessed in the sixth week following delivery.

Data collection tool

Sociodemographic and obstetric characteristics

The socio-demographic, and obstetric characteristics questionnaire included inquiries about various aspects, such as maternal and spousal age, educational level, occupation, income level, location, level of support from spouse and family, marital satisfaction, pregnancy history, abortion history, gestational week, delivery type, breastfeeding practices, preparation classes, childbirth attendant, episiotomy, analgesia, infant characteristics (sex, weight, height, head circumference), and infant status and issues.

The validity of the socio-demographic and obstetric characteristics questionnaire was assessed through content and face validity. Specifically, the questionnaire was reviewed by ten faculty members, and necessary

revisions were made based on their feedback to ensure its accuracy and relevance.

Checklist of maternal health problems

The Maternal Health Problems checklist comprises 22 essential items that cover various aspects of maternal care. The maternal health problems checklist comprises items such as constipation, hemorrhoids, anal ulcers, urinary tract infections, colds or fevers, back pain, leg cramps, joint pain, abdominal pain, dizziness, headaches, mouth inflammation and gum bleeding, breast inflammation and redness, breast pain, nipple fissures, mastitis, prolonged severe bleeding, sleep disturbances, urinary incontinence, weakness or fatigue, feelings of sadness and discomfort, and abnormal genital discharge. Rouhi et al. evaluated the validity and reliability of this questionnaire in Tabriz-Iran. The Cronbach's alpha coefficient was calculated as 0.94, and the ICC index was found to be significant at $p<0.001$. These results indicate strong internal consistency and high stability of the.

tool, there by affirming the reliability of the checklist [22]. In this study, the Cronbach's alpha coefficient was 0.80, confirming its reliability.

Checklist of prevention of pregnancy and postpartum care satisfaction levels

A researcher-made checklist was utilized in this study to assess the use of contraceptive methods and the level of satisfaction with postpartum care, with each section comprising three items.

The edinburgh postnatal depression scale (EPDS)

The Edinburgh Postnatal Depression Scale (EPDS), developed by Cox and colleagues in 1987, is a tool designed to evaluate depression during pregnancy and the postpartum period. Consisting of ten questions with four response options, the scale employs varying intensities across questions, with some ranging from low to high intensity (items 1, 2, and 4) and others from high to low (items 10, 9, 8, 7, 6, 5, 3). Responses are scored from zero to three based on symptom severity, and the total score, ranging from zero to 30, by summing the scores from all ten questions. The validity of the EPDS was established through a concurrent correlation coefficient of 0.78 with the Beck Depression Scale. Its reliability was assessed using Cronbach's alpha and the split-half method, yielding a coefficient of 0.75 [23]. Montazeri et al. reported Cronbach's alpha values for this questionnaire in the postpartum period to be within the range of 0.70 to 0.86, with a correlation coefficient of 0.80 [24]. In this study, the Cronbach's alpha coefficient was 0.72, further confirming its reliability.

Postpartum specific anxiety questionnaire (PSAS)

The PSAS developed by Davies et al. (2016) has been validated for its psychometric properties and serves as a reliable instrument for assessing postpartum anxiety. This 51-item questionnaire evaluates four components of anxiety: maternal competence and attachment anxieties; infant safety and welfare anxieties; practical infant care anxieties; and psychosocial adjustment to motherhood (25). The 16-item version of the PSAS-RSF is considered the most robust in terms of both theory and psychometrics due to its high number of items. This version demonstrates good psychometric properties and reliability; it is the first validated short instrument for measuring postpartum anxiety (PPA). With four items for each factor and response options ranging from "not at all" to "almost always," total score ranges from 16 to 64. The instrument exhibited average to good reliability with McDonald's ω ranging from 0.65 to 0.8; overall scale reliability was good up to 12 months after delivery (26). In this study, the Cronbach's alpha coefficient was 0.84, further confirming its reliability.

Infant care behavior questionnaire

The infant care behavior questionnaire, developed by Jamalivand et al. [25] comprises 22 items rated on a Likert scale from "always" to "never," with total score ranging from 22 to 88. The questionnaire's validity was confirmed through Content Validity Index (CVI) and Content Validity Ratio (CVR) assessments resulting in values of 0.95 and 0.99 respectively. Additionally, it demonstrated good internal consistency indicated by a Cronbach's alpha coefficient of 0.76. The Intra-class Correlation Coefficient (ICC) was found to be 0.85 demonstrating good reliability. In this study, the Cronbach's alpha coefficient was 0.71, further confirming its reliability.

The barkin index of maternal functioning (BIMF)

The Barkin Index of Maternal Functioning (BIMF), developed by Barkin et al. in 2007, is a questionnaire consisting of 20 items and seven subscales covering various aspects such as self-care; infant care; mother-child interaction; maternal psychological well-being; social support; management; and adaptation [26]. Each item is rated from zero to six resulting in a total score range of 0 to 120 with a higher score indicating better maternal functioning. The BIMF questionnaire assesses maternal functioning over the first twelve months following childbirth focusing on all relevant aspects of postpartum functioning. It has strong psychometric properties suitable for both research and clinical settings with a mother-centered approach [27]. Mirghafourvand et al. conducted a study on this tool's psychometric properties in Iran and finding Cronbach's alpha coefficient at 0.88 and ICC at 0.85 confirming its validity and reliability [28]. In this study, the

Cronbach's alpha coefficient was 0.76, further confirming its reliability.

The hurt, insult, threaten, and scream (HITS)

The HITS questionnaire designed to evaluate physical and verbal violence consists of four questions, each offering five response options with scores ranging from one to five per question. Total scores range from four to twenty with score exceeding ten indicating the presence of violence. Asadi et al. conducted a psychometric evaluation in Iran, finding Cronbach's alpha coefficient of 0.78 and an ICC of 0.86 confirming its validity and reliability [29]. In this study, the Cronbach's alpha coefficient was 0.86, further confirming its reliability.

Data analysis

Data were analyzed using SPSS software version 24. Normality of quantitative variables was evaluated using Kurtosis-Skewness along with visual charts (histograms). The postpartum depression variable did not exibite normal distribution before intervention at both second and sixth weeks while other quantitative variables (maternal functioning; postpartum- specific anxiety; infant care behavior; experience of violence) display normal distribution.

Descriptive statistics including number (percent) were used to describe socio-demographic and obstetric characteristics for categorical variables, while mean (standard deviation) was applied for quantitative data analysis. Independent t, Chi-square, Chi-square for trend, and Fisher's exact tests were used to assess the homogeneity between the two groups regarding socio-demographic and obstetric characteristics.

Mann-Whitney U tests compared postpartum depression between groups before intervention along with second week and sixth week assessment while ANCOVA adjusted for spouse support and history of infertility comparing groups on maternal functioning; specific postpartum anxiety; infant care behavior; experience of violence. Chi-square or Fisher's exact tests compared categorical variables including maternal health problems; satisfaction with postpartum care; contraception use among the study groups where $P<0.05$ was considered significant. All analyses were performed based on modified intention-to-treat.

Results

Baseline characteristics

There was no significant difference between the intervention and control groups in terms of socio-demographic and obstetric characteristics, except for level husband's support and infertility history. Most participants in both groups were housewives, and a majority of their spouses were self-employed. Educational attainment was similar across both groups, with one-third of women had a high school diploma and about one-fifth of fathers holding a university education. The economic status of participants was predominantly moderate in both groups. Additionally, a significant number of women reported receiving support from their spouses and expressed high satisfaction with their marital lives. Most participants also indicated that they received assistance in caring for their newborns (Table 1).

About half of the participants in the intervention group experienced normal vaginal deliveries, while a slightly lower percentage in the control group achieved the same outcome. Attendance at prenatal preparation classes was comparable between both groups, with some participants having previously attended these classes. Additionally, a small percentage of women in the intervention group reported a history of infertility) Table 2(. There were no significant differences in neonatal characteristics between the intervention and control groups)Table 3(.

The mean depression score prior to the intervention was 5.14 (7.75) in the intervention group and 5 (8.73) in the control group. According to the Mann-Whitney U test, there was no statistically significant difference between the two groups ($P=0.057$).

Post-intervention outcomes

At two-week post-intervention, the mean depression scores were 5.80 (4.71) in the intervention group and 6.75 (4.93) in the control group, with no significant difference observed based on the Mann-Whitney U test ($P=0.100$). Similarly, at six weeks post-intervention, the mean depression scores were 5.97 (4.69) in the intervention group and 6.00 (5.16) in the control group, with no statistically significant variance between the groups according to the Mann-Whitney U test ($P=0.346$).

The mean score for infant care behavior was 75.31 (6.05) in the intervention group and 74.05 (6.70) in the control group. Following adjustment for confounding variables using ANCOVA, there was no significant difference between the groups (mean difference [MD]: 1.28; 95% Confidence Interval [CI]: -0.31 to 2.82; $P=0.121$). Additionally, the mean score for maternal functioning was 102.48 (8.21) in the intervention group and 101.62 (9.05) in the control group, with no statistically significant difference between the groups after adjusting for confounding variables using ANCOVA (MD: 0.85; 95% CI: -1.26 to 2.98; $P=0.428$). The mean postpartum specific anxiety score was 22.29 (4.12) in the intervention group and 23.16 (5.65) in the control group, with no statistically significant difference between the groups after adjusting for confounding variables using ANCOVA (MD: -0.87; 95% CI: -2.09 to 0.34; $P=0.160$). The mean spouse violence score was 8.29 (3.31) in the intervention group and 8.91 (3.75) in the control group, with no significant difference between the two groups based on

Table 1 Sociodemographic characteristics of participants by study groups

Variables	Intervention *n* = 136 Mean (SD[e])	Control *n* = 136 Mean (SD[e])	*P*-value
Age	(6.78) 28.13	29.68 (6.19)	0.053[a]
Husband age	33.73 (5.65)	(6.50) 34.83	0.137[a]
Gestational age	38.43 (1.15)	38.43 (1.21)	1.000[a]
BMI(Kg/m^2)	25.23 (4.22)	26.22 (4.76)	0.080[a]
Job	n (%)	n (%)	
Housewife	130 (95.6)	129 (94.9)	0.776[b]
Employed	6 (4.4)	7 (5.1)	
Education			
Elementary	12 (8.8)	13 (9.6)	0.775[d]
Secondary school	47 (34.6)	48 (34.2)	
High school	11 (8.1)	7 (5.1)	
Diploma	45 (33.1)	52 (38.2)	
Academic	21 (15.4)	16 (11.8)	
Husband's job			
Unemployed	2 (1.5)	1 (0.7)	0.828[c]
Worker	19 (14.0)	20 (14.7)	
Employee	8 (5.9)	10 (7.5)	
Others[f]	107 (78.6)	105 (77.2)	
Husband's education			
Elementary	9 (6.6)	20 (14.7)	0.176[d]
Secondary school	45 (33.1)	41 (30.1)	
High school	8 (5.9)	10 (7.4)	
Diploma	46 (33.8)	41 (30.1)	
Academic	28 (20.6)	24 (17.6)	
Income			
Completely enough	30 (22.1)	30 (22.1)	0.627[d]
Somewhat enough	101 (74.3)	96 (70.6)	
Not enough	5 (3.7)	10 (7.4)	
Husband's support level			
Too much	52 (38.2)	46 (33.8)	0.010[c]
Much	47 (34.6)	28(20.6)	
Moderate	34 (25)	54(39.7)	
Low	3 (2.2)	6 (4.4)	
Very little	-	2 (1.5)	
Family's support level			
Too much	25 (18.4)	26 (19.1)	0.739[d]
Much	59 (43.4)	52 (38.2)	
Moderate	36 (26.5)	41 (30.1)	
Low	5 (3.7)	6 (4.4)	
Very little	11 (8.1)	11 (8.1)	
Husband's family's support level			
Too much	12 (8.8)	16 (11.8)	0.561[d]
Much	34 (25.0)	24 (17.6)	
Moderate	35 (25.7)	38 (27.9)	
Low	20 (14.7)	14 (10.3)	
Very little	35 (25.7)	44 (32.4)	
Marital Satisfaction			
Completely satisfied	100 (73.5)	111 (81.6)	0.297[d]
Relatively satisfied	26 (19.1)	15 (11)	
Neither satisfied nor dissatisfied	8 (5.9)	9 (6.6)	
Relatively dissatisfied	2 (1.5)	1 (0.7)	
Help to take care of the baby			

Table 1 (continued)

Variables	Intervention $n=136$ Mean (SD[e])	Control $n=136$ Mean (SD[e])	*P*-value
Yes	111 (81.6)	109 (80.1)	0.758[b]
No	25 (18.4)	27 (19.9)	
Housing status			
Private	92 (67.6)	89 (65.4)	0.700[b]
Rental	44 (32.4)	47 (34.6)	
Living with the spouse's family			
Yes	31 (22.8)	32 (23.5)	0.886[b]
No	105 (77.2)	104 (76.5)	
Location			
City	97 (71.3)	90 (66.2)	0.730[c]
Village	39 (28.7)	46 (33.9)	

[a]Independent t- test; [b] Chi-Square; [c] Fisher's Exact Test; [d] Chi-Square for trend; [e] Standard Deviation; [f] It means: other (driver, baker, hairdresser, builder, shopkeeper)

ANCOVA (MD: -0.26, 95% CI: -1.10 to 0.58, $P=0.542$) (Table 4).

There were no significant differences in the frequency of maternal problems at the second and sixth weeks post-delivery between the intervention and control groups (Table 5). Regarding breastfeeding at two weeks post-delivery, infant formula use was reported by 12.9% in the intervention group compared to 23.4% in the control group, showing a significant difference between the two groups based on the chi-square test ($P=0.027$). In terms of contraceptive method usage, 24.3% of the intervention group and 22.2% of the control group utilized reliable contraceptive methods, with a significant difference observed between the groups according to Fisher's exact test ($P=0.035$) (Table 6).

Mothers' satisfaction with education and recommendations provided was notably high, with 98.5% of mothers in the intervention group expressing satisfaction compared to 88.2% in the control group; Fisher's exact test indicated a significant difference between these two groups ($P=0.002$) (Table 7).

Discussion

This study aimed to assess the effect of clinical guidelines on maternal outcomes. The results indicated that there were no statistically significant differences between the two groups in terms of maternal functioning, infant care behavior, and mental health conditions. To date, no studies have been conducted in Iran to investigate the effect of clinical postpartum guidelines on maternal outcomes. However, similar studies have examined the effect of educational interventions on postpartum outcomes.

For instance, a study in 2020 involving 68 women attending health centers implemented four counseling sessions utilizing a skills training approach for the intervention group. The findings revealed that counseling with a skills training approach positively influenced maternal functioning, self-efficacy, and neonatal care behavior. This study was conducted in health centers approximately five years ago. Over this period, significant changes have occurred in Iran's healthcare system in terms of quality of care. Additionally, the widespread availability of social media has enhanced information accessibility and communication, potentially impacting maternal performance through increased awareness among individuals [30].

In the study by El Ayadi et al. (2023), web-based health education and social support were found to enhance knowledge regarding childbirth readiness and planning, promote health check-ups with healthcare providers, increase awareness of postpartum risk signs, and provide information on family planning methods. However, no significant difference was observed between groups in terms of postpartum mental health outcomes [31]. Various individual and social factors influence mental health, contributing to the multifactorial nature of depression [32]. Preventing and treating postpartum depression often requires comprehensive interventions that address multiple aspects. Studies have shown that psycho-social, psychological, and pharmacological interventions are effective in both the prevention and treatment of postpartum depression [33, 34].

Consistent with the present study, Gürkan et al. (2017) showed that prenatal education did not yield a significant effect on maternal functional status and depression during the sixth week post-delivery (both at the 6th week and 6th month follow-ups) [35]. The research was carried out at Istanbul State Hospital, where approximately 70% of mothers had an educational level below a diploma. Similarly, in this study, half of the mothers had an educational level below a diploma, and 95% were homemakers. It is noted that the socio-educational background of mothers can influence the efficacy of educational interventions [36]. With the limited effect on postpartum depression, integrating education with psychosocial interventions and supportive programs may provide a more significant

Table 2 Obstetrics characteristics by study groups

Variable	Intervention (*n* = 136), n (%)	Control (*n* = 136), n (%)	*P*-value
Parity			
1	60 (44.1)	49 (36.1)	0.238[a]
2	59 (43.4)	60 (44.1)	
3 & 4	17 (12.5)	27 (19.8)	
Abortion history			
Yes	34 (25.0)	35 (25.7)	0.653[b]
No	102 (75.0)	101 (74.3)	
Having unwanted pregnancy			
Yes	34 (25.0)	34 (25.0)	1.000[a]
No	102 (75.0)	102 (75.0)	
Type of delivery			
Vaginal	72 (52.9)	57 (41.9)	0.065[a]
Elective C/S	47 (34.6)	66 (48.5)	
Emergency C/S	17 (12.5)	13 (9.6)	
Assessment of childbirth			
Easy	21(15.4)	15 (11.1)	0.536[a]
Moderate	50 (36.8)	55 (40.4)	
Hard	65 (47.8)	66 (48.5)	
Episiotomy			
Yes	33 (84.6)	31 (83.8)	0.921[a]
No	6 (15.4)	6 (16.2)	
Childbirth attendant			
Obstetrician	16 (12.6)	24 (18.5)	0.403[a]
Resident	94 (74)	95 (73.1)	
Midwife	7 (5.5)	4 (3.1)	
Midwifery instructor with student	10 (7.9)	7 (5.4)	
Drug analgesia			
Yes	45 (61.7)	39 (69.3)	0.411[b]
No	27 (38.2)	18 (30.6)	
Type of analgesia			
Remifentanil	42 (93.3)	38 (94.7)	0.499[b]
Pethidine, Promethazine-Hyoscine	3 (6.6)	1 (2.6)	
Postpartum bleeding			
Yes	13(9.6)	(14.2) 19	0.240[a]
No	(90.4) 123	(85.8) 115	
Participation in pregnancy education class			
Yes	(19.9) 27	(19.1) 26	0.888[a]
No	(80.1) 109	(80.9) 110	
Psychological stress for the type of delivery			
Yes	30 (22.1)	48 (35.6)	0.880[a]
No	99 (72.8)	88 (64.4)	
Pregnancy care provider			
Obstetrician	112 (83.1)	115 (84.5)	0.956[b]
Midwife	11 (8.1)	9 (6.6)	
Health center	12 (8.8)	12 (8.8)	
Receiving of postpartum training			
Yes	36 (26.5)	35 (25.7)	0.890[a]
No	100 (73.5)	101 (74.3)	
Infertility history			
Yes	3 (2.2)	12 (8.8)	0.017[a]
No	133 (97.8)	124 (91.2)	

[a] Chi-Square; [b] Fisher's Exact Test

Table 3 Characteristics of newborns by study groups

Variable	Intervention *n* = 136	Control *n* = 136	*P*-value
	Mean (SD[d])	Mean (SD[d])	
Apgar			
First minute	8.96 (0.28)	8.88 (0.83)	0.246[a]
The fifth minute	9.99 (0.08)	9.96 (0.25)	0.204[a]
Weight	3196 (430)	3184 (391)	0.818[a]
Height	50.57 (0.17)	50.32 (0.16)	0.613[a]
Around the head	34.80 (1.34)	34.55 (0.19)	0.083[a]
Duration of skin contact (minutes)	12.97 (1.9)	10.65 (1.7)	0.305[a]
Child sex	n (%)	n (%)	
Female	64 (47.1)	76 (55.8)	0.182[b]
Boy	72 (52.9)	60 (44.1)	
Skin contact with the baby			
Yes	91 (66.9)	92 (67.6)	0.898[c]
No	45 (33.1)	44 (32.4)	
First breastfeeding			
Up to an hour after delivery	70 (51.5)	65 (47.8)	0.749[b]
Up to two hours after delivery	33 (24.3)	33 (24.3)	
After the second hour after delivery	33 (24.3)	38 (27.9)	
Lactation status			
Only breast milk	130 (95.6)	(97) 132	0.590[c]
Breast milk and formula	4 (2.9)	(2.2) 3	
Breast milk and oral serum	2 (1.5)	1 (0.7)	

[a] independent t- test; [b] Chi-Square; [c] Fisher's exact test; [d] standard deviation

Table 4 Comparison of maternal outcomes by study groups

Variable	Intervention		Control		*P*-value
	Mean (SD)	Median (Per 25 to 75)	Mean (SD)	Median (Per 25 to 75)	
Depression (Score range: 0–30)					
Before intervention	(*n* = 136)		(*n* = 136)		0.057[a]
	5.14)7.75(	7 (4 to 10)	5 (8.73)	9 (4 to 12)	
Second week	(*n* = 132)		(*n* = 128)		0.100[a]
	5.80)4.71 (	5 (2 to 9)	(4.93) 6.75	6 (3 to 9)	
Sixth week	(*n* = 132)		(*n* = 127)		0.346[a]
	5.97)4.69 (	5 (2 to 10)	6.00 (5.16)	5 (2 to 9)	
Variable	Intervention *n* = 132 Mean (SD)	Control *n* = 127 Mean (SD)	Mean difference (95% Confidence Interval)		P-value
Infant care behavior (Score range: 22–88)	6.05)) 75.31	6.70)) 74.05	1.28 (-0.31 to 2.82)		0.121[b]
Maternal functioning (Score range: 0-120)	102.48 (8.21)	(9.05) 101.62	0.85 (-1.26 to 2.98)		0.428[b]
Specific postpartum anxiety (Score range: 16–64)	22.29 (4.12)	23.16 (5.65)	-0.87 (-2.09 to 0.34)		0.160[b]
Spousal violence (Score range: 5–25)	8.29 (3.31)	(3.75) 8.91	-0.26 (-1.10 to 0.58)		0.542[b]

[b]ANCOVA by adjusting the variables of husband's support and infertility history. [a]Mann-Whitney U;

advantage in improving maternal mental health in the postpartum period.

The study's findings revealed a significant positive effect of the intervention on exclusive breastfeeding within the first two weeks. Utilizing supportive and educational strategies has been linked to increased rates of maternal breastfeeding in various research studies [37–39]. The intervention demonstrated a significant effect on the adoption of reliable contraception methods, aligning with findings from previous studies that have associated educational interventions with improved birth spacing and contraception utilization [40, 41].

Table 5 Frequency of maternal health problems by study groups

Variable	Intervention (*n* = 132), n (%)[c]	Control (*n* = 128), n (%)[c]	*P*-value	Intervention (*n* = 132), n (%)[c]	Control (*n* = 127), n (%)[c]	*P*-value
	Second week			Sixth week		
Constipation	19 (18.3)	16 (13.3)	0.583[b]	13 (9.8)	17 (13.4)	0.439[a]
Hemorrhoids	3 (2.5)	3 (2.3)	1.000[b]	2 (1.5)	3 (2.4)	0.679[b]
Anal ulcer	1 (0.8)	-	1.000[b]	2 (1.5)	1 (0.8)	1.000[b]
Urinary tract infections	5 (4.5)	11 (9.1)	0.107[a]	3 (2.3)	3 (2.4)	1.000[b]
Colds or fevers	6 (3.8)	11 (24.2)	0.187[a]	6 (4.5)	5 (3.9)	0.808[a]
Back pain	31 (24.2)	29 (24.2)	0.551[a]	22 (16.7)	33 (26.2)	0.062[a]
Joint pain leg cramps	7 (5.3)	5 (4.2)	0.592[a]	8 (6.1)	12 (9.5)	0.298[a]
Abdominal pain	9 (6.8)	14 (10.9)	0.242[a]	4 (3)	3 (2.4)	1.000[b]
Dizziness	11 (8.3)	13 (10.8)	0.672[a]	8 (6.1)	11 (8.7)	0.422[a]
Headaches	16 (12.1)	16 (13.3)	0.926[a]	7 (5.8)	7 (5.5)	0.941[a]
Mouth inflammation	16 (12.1)	17 (14.2)	0.779[a]	12 (9.1)	11 (8.7)	0.903[a]
Gum bleeding	7 (5.3)	10 (8.3)	0.413[a]	7 (5.3)	7 (5.5)	0.941[a]
Breast inflammation and redness	1 (0.8)	3 (2.5)	0.364[b]	-	1 (0.8)	0.490[b]
Breast pain	3 (4)	6 (5)	0.535[b]	1 (0.8)	-	1.000[b]
Nipple fissures	41 (31.1)	39 (30.5)	0.918[a]	4 (3)	2 (1.6)	0.684[b]
Mastitis	2 (1.5)	-	0.498[b]	-	-	
Prolonged severe bleeding	1 (0.8)	1 (0.8)	1.000[b]	-	1 (0.8)	0.476[b]
Sleep disturbances	-	3 (2.5)	0.118[b]	3 (2.3)	4 (3.3)	0.718[b]
Urinary incontinence	3 (2.3)	1 (0.8)	0.622[b]	3 (2.3)	1 (0.8)	0.622[b]
Weakness or fatigue	11 (9.2)	17 (12.9)	0.265[a]	20 (15.2)	18 (15)	0.824[a]
Feelings of sadness and discomfort	6 (4.5)	6 (4.7)	0.956[a]	3 (2.3)	3 (2.5)	0.853[b]
Abnormal genital discharge	1 (0.8)	1 (0.8)	1.000[b]	-	1 (0.8)	0.490[b]

[a] Chi-Square; [b] Fisher's Exact Test; [c] Number (Percent)

Table 6 Prevention of pregnancy in the sixth week post-delivery by study groups

Prevention method	Intervention (*n* = 132) *n* (%)	Control (*n* = 127) *n* (%)	*P*-value
Failure to utilize preventive methods	100 (75.8)	99 (77.8)	0.035[b]
Utilize preventive methods	32 (24.3)	28 (22.2)	
Time of initiation of sexual activity after childbirth (in days)	Mean (SD[c])	Mean (SD[c])	0.394[a]
	41.02 (7.52)	41.81 (7.22)	

[a] independent T- test, [b] Fisher's exact test; [c] standard deviation

Table 7 Comparison of postpartum care satisfaction levels among study groups

Variable	Intervention group (*n* = 132), n (%)			Control group (*n* = 127) n (%)			*P*-value
	Yes	No	To some extent	Yes	No	To some extent	
Satisfaction with postpartum care	115 (87.1)	9 (6.8)	8 (6.1)	106 (83.5)	8 (6.3)	13 (10.2)	0.468[a]
Satisfaction with the training and advice provided	130 (98.5)	1 (0.8)	1 (0.8)	112 (88.2)	5 (3.9)	10 (7.9)	0.002[b]
Satisfaction with the attention and respect of caregivers	115 (87.1)	8 (6.1)	9 (6.8)	105 (82.7)	10 (7.9)	12 (9.4)	0.604[a]

[a] Chi-Square; [b] Fisher's Exact Test

From the perspective of mothers, both care and education are crucial components of the postpartum hospitalization experience [16]. In the current study, it was found that 98.5% of mothers in the intervention group expressed satisfaction with the recommendations and training provided compared to 88.2% in the control group. Furthermore, 87% of mothers in the intervention group reported satisfaction with postpartum care compared to 83.5% in the control group.

The adaptation of clinical guidelines from WHO and NICE has led to adapting recommendations related to maternal and neonatal care by expert panels in Iran [42].

At present, most WHO recommendations are applicable in Iran. Only a small number of recommendations on maternal and infant care underwent minor adjustments based on the panel of experts. Additionally, some recommendations pertaining to health system such as continuous midwifery care and home care, need to provide cultural context, facilities, and infrastructure for effective implementation.

Study strengths and limitations.

One significant limitation of the study was the absence of a validated tool in Iran for assessing postpartum experiences. Using a valid tool to measure the consequences of postpartum experiences and the quality of postpartum care could have provided more insightful results regarding the implementing the WHO clinical guideline. The study faced constraints due to the absence of certain recommendations related to the management system, such as continuous midwifery care and home care. These limitations stemmed from the lack of cultural context, necessary facilities and infrastructure for their execution. Another limitation was the relatively low socio-economic status of the participating mothers; most had medium to low education levels and primarily sought services in educational hospitals serving rural areas. This may affect the generalizability of findings. Enhancing education, economic status, and social empowerment for women in developing countries, especially in rural and marginalized communities, is essential for improving educational and care interventions' effectiveness. Addressing these issues requires strategic planning and national policies at a macro level.

The timing and duration of postpartum education coincided with eight weeks after delivery during which mothers faced recovery challenges alongside physical health issues, household responsibilities or neonatal concerns like jaundice or breastfeeding difficulties; infant sleep patterns; these factors may have hindered some mothers from actively participating or fully benefiting from new educational materials. Planning educational support interventions starting from pregnancy through at least six months post-delivery could potentially yield more substantial effects on postpartum outcomes and maternal mental health. Another limitation is that implementing a double-blind approach was not feasible due to our specific study design.

A notable strength of the study was establishing a network group for mothers along with disseminating educational materials through photos, videos, and audio files, this aligns with the WHO recommendation No.54 (targeted digital communication). It facilitated continuous support, communication and interaction among mothers, enabling the sharing of breastfeeding experiences and caregiving practices among peers.

Conclusion

This study revealed no significant differences in maternal functioning, anxiety, depression, infant care behavior, and experiences of violence between the intervention and control groups. However, the intervention group demonstrated a significantly lower rate of infant formula use and a higher satisfaction level with the education and recommendations provided compared to the control group. Additionally, a higher percentage of women in the intervention group utilized reliable contraceptive methods. These findings highlight the potential benefits of integrating culturally tailored clinical guidelines into postpartum care in Iran, emphasizing the importance of further research and implementation efforts in this critical area.

In light of our findings, we propose several suggestions for future research aimed at improving postpartum care. Future studies could focus on developing and implementing comprehensive training programs for healthcare providers that emphasize the importance of postpartum care and the use of evidence-based clinical guidelines. Investigating the integration of mental health services into postpartum care could provide valuable insights into addressing issues such as postpartum depression and anxiety more effectively. Conducting longitudinal studies may help in understanding the long-term effects of postpartum interventions on maternal mental health and infant care practices, allowing for a deeper insight into the sustainability of outcomes over time. Future studies should aim to include diverse populations to assess the effectiveness of postpartum interventions across different cultural and socioeconomic backgrounds, ensuring that guidelines are tailored to meet the needs of all mothers. Exploring the use of technology, such as mobile health applications, could enhance follow-up care and provide continuous support for new mothers, improving their overall experience during the postpartum period.

Abbreviations

WHO	World Health Organization, NICE: National Institute for Health and Care Excellence, 95% CI:95% Confidence Interval
ANCOVA	Analysis of Covariance
BIMF	Barkin Index of Maternal Functionning
EPDS	Edinburgh Postpartum Depression Scale
HITS	The Hurt, Insult, Threaten, and Scream
MD	Mean Difference
RCT	Randomized Controlled Trial
SD	Standard Deviation

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Author contributions

MM, SMAC, and LAN contributed to the design of the study. MM and LAN have written the first draft of this article and SMAC provided supervision to the manuscript drafting and revisions. SMAC analyzed data. All authors have

critically read the text and contributed with inputs and revisions, and all authors read and approved the final manuscript. All authors are members of guideline evaluation group.

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Data availability
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Deceleration

Ethics approval and consent to participate
Written informed consent will be obtained from each participant. This protocol has been approved by the Ethics Committee of the Tabriz University of Medical Sciences, Tabriz, Iran (code number: IR.TBZMED.REC.1401.661). All the steps/ methods will be performed in accordance with the relevant guidelines and regulations.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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