The effect of multi-dimensional postpartum visits on increasing the breastfeeding rate of parturients with inverted nipple: a randomised study

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Background: Postpartum breastfeeding is an effective guarantee for the healthy growth of newborns. Vigorously promoting breastfeeding has substantial benefits for the physical and mental health of mothers and babies, and can also benefit the entire society. The purpose of this study was to explore the effect of multi-dimensional postpartum visits (MDPV) applied to parturients with inverted nipple on improving breastfeeding rates.

Methods: A total of 114 parturients with inverted nipples who gave birth in the Drum Tower Hospital Affiliated to Nanjing University School of Medicine from October 2018 to October 2019 and successfully breastfed in the hospital were selected. The patients were divided into two groups according to the random number table method, with 57 cases in each group. The control group received routine postpartum visits, while the observation group received MDPV. Breastfeeding knowledge, rate of exclusive breastfeeding, incidence of maternal mastitis, rate of infant hospitalization, and level of self-efficacy were compared between the two groups.

Results: Breastfeeding knowledge and the rate of exclusive breastfeeding at 1, 3, and 6 months after discharge in the observation group were higher than those in the control group (P<0.05). The incidence of maternal mastitis and the rate of infant hospitalization in the observation group were lower than those in the control group (P<0.05). The self-efficacy scores of the observation group at 1 and 6 months after discharge were higher than those of the control group (P<0.05).

Conclusions: The application of MDPV to parturients with inverted nipples can improve the breastfeeding rate, enhance breastfeeding knowledge, reduce the incidence of maternal mastitis and infant hospitalization rate, and improve breastfeeding self-efficacy. Thus, it is worthy of promotion.

Keywords: Multi-dimensional postpartum visits (MDPV); inverted nipples; parturients; breastfeeding; mastitis

Introduction

Postpartum breastfeeding is an effective guarantee for the healthy growth of newborns. Vigorously promoting breastfeeding offers substantial benefits for the physical and mental health of mothers and babies, and can also benefit the entire society (1). Nipple depression refers to a nipple that does not protrude from the areola plane, or one that is pointing inwardly, like a crater. Nipple depression is a clinically high incidence of nipple malformations, which has a greater negative impact on breastfeeding (2). Previous

research has shown that inverted nipple has a serious impact on newborn breastfeeding within 4 months, and the exclusive breastfeeding rate is only 7.87% (3). Therefore, an approach to effectively increase the rate of exclusive breastfeeding of parturients with inverted nipple has become a key focus in obstetrics and gynecology research (4). Multi-dimensional postpartum visit (MDPV) refers to the follow-up of parturients through a variety of methods in order to effectively improve their medical compliance and promote the development of healthy behaviors and habits. This study compared the effects of MDPV and conventional postpartum visits in terms of breastfeeding knowledge, exclusive breastfeeding rate, incidence of maternal mastitis, infant hospitalization rate, and self-efficacy level of parturients with inverted nipples, aiming to provide a reference for breastfeeding intervention measures for parturients with inverted nipples. We present the following article in accordance with the CONSORT reporting checklist (available at http://dx.doi.org/10.21037/apm-21-165).

Methods

Patient selection

A total of 114 parturients with inverted nipples who gave birth in the Drum Tower Hospital Affiliated to Nanjing University School of Medicine from October 2018 to October 2019 and successfully breastfed in the hospital were selected. The patients were divided into two groups according to the random number table method, with 57 cases in each group. The inclusion criteria were as follows: (I) patients who met the diagnostic criteria for nipple depression; (II) all were singletons and full-term primiparous women; (III) patients who successfully breastfed in the hospital; and (IV) patients with sufficient language communication skills. Patients were excluded based on the following criteria: (I) presence of pregnancy complications; (II) those with mental disorders; (III) those with cognitive dysfunction; (IV) nipple depression caused by secondary factors; and (V) those who could not cooperate with regular follow-up. This study was approved by the Ethics Committee of the Drum Tower Hospital Affiliated to Nanjing University School of Medicine {Ethics approval number: [(2018)LC116]} and was conducted in accordance with the Declaration of Helsinki. All subjects provided informed consent.

Interventions

The control group received routine postpartum visits.

Intervention staff provided breastfeeding-related education before the parturients were discharged from the hospital, distributed breastfeeding information brochures to each parturient, and established a 24-hour breastfeeding consultation hotline to promptly resolve problems for the parturients. The parturients were followed up by telephone at 1, 3, and 6 months following discharge from the hospital, and the duration of each follow-up consultation was 10–15 minutes.

In the observation group, intervention staff provided a detailed explanation of the content, purpose, and significance of the visit measures to the parturients before leaving the hospital, so that the parturients could fully understand and actively cooperate. Intervention staff fully assessed the breastfeeding status of parturients and implemented MDPV as follows. (I) Establishment of a hospital return visits team. The team members included head nurses and specialist nurses, with the head nurse acting as the team leader. Group members discussed and formulated management systems, related procedures, and responsibilities. The responsibility of the head nurse was primarily to plan and manage, and the responsibility of the specialist nurses was to implement specific return visit measures. Before leaving the hospital, the parturients provided their contact information, including phone number, home address, WeChat etc. Statistics were then sent to the community health service center where the parturient was located. (II) Online visit. Intervention staff established a WeChat group for nipple depression, regularly sent information about breastfeeding and nipple depression to parturients, and communicated with them on the WeChat platform to promptly answer their questions. (III) Continuing health education in the community. The community health service center established a nipple depression nursing and breastfeeding clinic. This outpatient clinic was used to receive re-examinations of the parturients 42 days after delivery and 4 months after discharge, in order to grasp the situation of maternal nipple depression and breastfeeding, and provide one-on-one breastfeeding practice guidance. Psychological counseling was also provided to mothers who failed breastfeeding due to inverted nipples in order to enhance their confidence in breastfeeding. (IV) Home visits. Home follow-up was conducted at the end of the first weekend and the end of the first month following discharge. Participants in the home follow-up were the hospital return visit team and the nursing staff of the community health service center. The content mainly included the correction of indented

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nipples and breastfeeding posture, as well as psychological counseling, etc. This collaborative approach was carried out together with the mothers in order to formulate personalized goals, solve specific problems, and provide instruction regarding correct treatment measures according to the degree of indented nipple. (I) Depressed nipple of degree I (The inverted nipple can be squeezed out easily by hand, and the size of the nipple after extrusion is similar to that of ordinary people). Warm the nipple with a warm towel for 5–10 minutes. Then, with one hand supporting the breast, gently grasp the nipple and pull it outwards using the thumb and index finger of the other hand, while simultaneously twisting the nipple left and right to induce the milk reflex. (II) Depressed nipple of degree II (the nipples are all sunken in the areola, but the nipples can be squeezed out by hand. The nipples are smaller than normal, and most of them have no nipples). The parturient or her husband lays their thumbs on both sides of the inverted nipples with both hands, and slowly pulls the areola skin and subcutaneous tissue to the side to make the nipples protrude outward. Subsequently, the thumbs should be placed above and below the nipples, and are slowly pulled vertically at the same time. (III) Depressed nipple of degree III (the nipple is completely buried under the areola, and the inverted nipple cannot be pulled out). Use a medical nipple protector to suck out the nipple so that it protrudes from the areola.

Evaluation indexes

Breastfeeding knowledge

The two groups were evaluated using a self-made breastfeeding knowledge questionnaire for parturients with inverted nipples in our hospital. The total score of the questionnaire was 100 points; full knowledge: 85–100 points; partial knowledge: 70–84 points; no knowledge: <70 points. Awareness = full knowledge + partial knowledge.

The rate of exclusive breastfeeding

The breastfeeding situation (including exclusive breastfeeding, mixed feeding and artificial feeding) was counted in the two groups at 1, 3, and 6 months after discharge from the hospital, and a comparative analysis was performed.

The incidence of maternal mastitis and the rate of infant hospitalization

The incidence of maternal mastitis and the rate of infant hospitalization in the two groups were counted, and a comparative analysis was performed.

The level of self-efficacy

The Chinese version of the Breastfeeding Self-Efficacy Scale was used to evaluate the breastfeeding self-efficacy level of parturients at 1 and 6 months postpartum. According to the Likert scoring method, a score of 1 point was given for "no confidence at all", and 5 points denoted "very confident". The total score was between 14 and 70, with a higher total score indicating a higher level of breastfeeding self-efficacy of mothers (5).

Statistical analyses

Statistical analysis was performed using SPSS20.0 (SPSS Inc., Chicago, IL, USA). Measurement data were expressed as mean ± standard deviation and compared using two-tailed t-tests. Count data were reported as rates and percentages, and compared using the chi-squared (χ^2) test or rank-sum test. P<0.05 was considered statistically significant.

Results

General information

This study included 114 parturients with inverted nipple. Subjects in the control group were 22–34 years of age, with an average age of 28.95±2.44 years; delivery method: 40 cases of normal delivery, 17 cases of caesarean section; degree of nipple depression: degree I: 30 cases, degree II: 25 cases, degree III: two cases; education level: primary school: 12 cases, middle school: 28 cases, college degree and above: 17 cases.

Parturients in the observation group were 20–33 years of age, with an average age of 28.89±2.65 years; delivery method: 38 cases of normal delivery, 19 cases of caesarean section; degree of nipple depression: degree I: 32 cases, degree II: 23 cases, degree III: three cases; education level: primary school: 10 cases, middle school: 27 cases, college degree and above: 20 cases. There were no statistically significant differences in the general information of the two groups of parturients (P>0.05), and they were comparable. See *Table 1* for details.

Breastfeeding knowledge

In the control group, 20 cases were had full breastfeeding knowledge, 18 cases had partial knowledge, 19 cases had no knowledge, and the awareness was 66.67%. Meanwhile, in the observation group, 33 cases had full breastfeeding

Table 1 Comparison of general information between the two groups (n, %)

Item	Control group (n=57)	Observation group (n=57)	Statistics value	P value
Age ($\bar{x} \pm$ S, years)	28.95±2.44	28.89±2.65	t=0.128	0.900
Delivery method			χ^2=0.162	0.687
Normal delivery	40 (70.18)	38 (66.67)		
Caesarean section	17 (29.82)	19 (33.33)		
Degree of nipple depression			χ^2=0.353	0.724
Degree I	30 (52.63)	32 (56.14)		
Degree II	25 (43.86)	23 (40.35)		
Degree III	2 (3.51)	2 (3.51)		
Education			χ^2=0.659	0.510
Primary school	12 (21.05)	10 (17.54)		
Middle school	28	27		
College degree and above	17	20		

Table 2 Comparison of knowledge of breastfeeding between the two groups (n, %)

Group	Full knowledge	Partial knowledge	No knowledge	Awareness
Control group (n=57)	20 (35.09)	18 (31.58)	19 (33.33)	38 (66.67)
Observation group (n=57)	33 (57.89)	21 (36.84)	3 (5.26)	54 (94.74)
χ^2 value	–	–	–	14.419
P value	–	–	–	0.000

knowledge, 21 cases had partial knowledge, three cases had no knowledge, and the awareness was 94.74%. The breastfeeding knowledge of parturients in the observation group was higher than that of the control group, and the difference was statistically significant (χ^2=14.419, P=0.000). See *Table 2* for details.

The rate of exclusive breastfeeding

In the observation group, at 1 month after discharge, 42 cases were exclusively breast-fed, 11 cases were mixed-fed, and four cases were artificially fed. At 3 months after discharge, 38 cases were exclusively breast-fed, 12 cases were mixed-fed, and seven cases were artificially fed. At 6 months after discharge, 33 cases were exclusively breast-fed, 14 cases were mixed-fed, and 10 cases were artificially fed.

In the control group, at 1 month after discharge, 30 cases were exclusively breast-fed, 15 cases were mixed-fed, and 12 cases were artificially fed. At 3 months after

discharge, 24 cases were exclusively breast-fed, 18 cases were mixed-fed, and 15 cases were artificially fed. At 6 months after discharge, 18 cases were exclusively breast-fed, 20 cases were mixed-fed, and 19 cases were artificially fed. The rates of exclusive breastfeeding at 1, 3, and 6 months after discharge in the observation group were higher than those in the control group (P<0.05). See *Table 3* for details.

The incidence of maternal mastitis and the rate of infant hospitalization

There were three cases of mastitis in the observation group, and the incidence of mastitis was 5.26%. Meanwhile, there were 13 cases of mastitis in the control group, and the incidence of mastitis was 22.81%. The incidence of maternal mastitis in the observation group was significantly lower than that in the control group (χ^2=7.270, P=0.007).

Table 3 Comparison of breastfeeding rates between the two groups (n, %)

Time	Group	Exclusive breastfeeding	Mixed feeding	Artificial feeding
1 month after discharge	Control group (n=57)	30 (52.63)	15 (26.32)	12 (21.05)
	Observation group (n=57)	42 (73.68)	11 (19.30)	4 (7.02)
	χ^2 value	5.429	0.797	4.653
	P value	0.020	0.372	0.031
3 months after discharge	Control group (n=57)	24 (42.11)	18 (31.58)	15 (26.32)
	Observation group (n=57)	38 (66.67)	12 (21.05)	7 (12.28)
	χ^2 value	6.931	1.629	3.604
	P value	0.008	0.202	0.058
6 months after discharge	Control group (n=57)	18 (31.58)	20 (35.09)	19 (33.33)
	Observation group (n=57)	33 (57.89)	14 (24.56)	10 (17.54)
	χ^2 value	7.983	1.509	3.746
	P value	0.005	0.219	0.053

Table 4 Comparison of the incidence of maternal mastitis and the rate of infant hospitalization between the two groups (n, %)

Group	Incidence of maternal mastitis	Infant hospitalization rate
Control group (n=57)	13 (22.81)	11 (19.30)
Observation group (n=57)	3 (5.26)	1 (1.75)
χ^2 value	7.270	9.314
P value	0.007	0.002

In the observation group, one infant was hospitalized, and the infant hospitalization rate was 1.75%, while in the control group, 11 infants were hospitalized, and the infant hospitalization rate was 19.30%. The hospitalization rate of infants in the observation group was markedly lower than that in the control group (χ^2=9.314, P=0.002). See *Table 4* for details.

The level of self-efficacy

The self-efficacy level scores of the parturients in the observation group at 1 month and 6 months after discharge were 53.09±4.71 and 55.79±4.68 points, respectively. The self-efficacy level scores of parturients in the control group at 1 month and 6 months after discharge were 46.85±3.68 and 49.56±3.85 points, respectively. The self-efficacy scores of the observation group were notably higher than those of the control group at 1 and 6 months after discharge (t=7.882, 7.761; P=0.000, 0.000). See *Table 5* for details.

Discussion

Newborns are in a stage of rapid growth and development after birth, and their nutritional requirements are more comprehensive. The best substance to meet the requirement of newborns is breast milk (6). Previous research has shown that breast milk can fully meet the nutritional needs of newborns' brains and bones, and the ratio of calcium to phosphorus and other nutrients contained in breast milk were most suitable for the development of newborns (7,8). However, inverted nipples will make it difficult for newborns to breastfeed After repeated feeding failures, parturients will likely experience both physical and mental fatigue. In addition, poor engagement of the newborns' mouth and nipples can also cause breast pain and cracked nipples, which significantly reduces the breastfeeding rate, causing adverse effects for both mothers and babies (9,10). Moreover, it is more difficult for parturients to breastfeed after discharge from the hospital because they do not have

Table 5 Comparison of self-efficacy levels between the two groups ($\bar{x} \pm S$, points)

Group	1 month after discharge	6 months after discharge
Control group (n=57)	46.85±3.68	49.56±3.85
Observation group (n=57)	53.09±4.71	55.79±4.68
t value	7.882	7.761
P value	0.000	0.000

access to professional guidance from medical staff (11). In this study, the implementation of MDPV for parturients with inverted nipples achieved good results.

The results of this study showed that the breastfeeding knowledge of parturients in the observation group was higher compared to those in the control group (P<0.05). This indicated that the implementation of MDPV for parturients with inverted nipples could effectively improve their breastfeeding knowledge. This measure not only provides traditional in-person health education to parturients, but also implements online visits through the establishment of a network platform to overcome the limitations of time and space, allowing parturients to consult with medical staff who can provide professional advice anytime and anywhere after discharge from the hospital (12,13). Intervention staff is also able to regularly provide breastfeeding and nipple depression related information to parturients via the WeChat platform, so as to effectively correct previous misconceptions and improve breastfeeding awareness (14).

The results of this study also showed that the rate of exclusive breastfeeding in the observation group was higher than that in the control group (P<0.05). This demonstrated that MDPV could effectively increase the rate of exclusive breastfeeding following discharge from hospital. Medical and nursing staff from the community health service center can guarantee breastfeeding guidance for parturients after discharge by way of joint home visits, enabling them to understand the importance of exclusive breastfeeding within 6 months postpartum to satisfy the various nutritional of the newborn. It will also help mothers realize that, through targeted nipple care, indentation of the nipple will not affect normal breastfeeding, thereby strengthening their confidence for exclusive breastfeeding (15,16). Through the process of home visits, intervention staff can help the parturients solve problems in breastfeeding by formulating individualized measures, and ultimately increase the rate of exclusive breastfeeding (17).

Moreover, the results of this study revealed that the incidence of maternal mastitis and infant hospitalization in the observation group were lower than those in the control group (P<0.05). This showed that MDPV could effectively reduce the incidence of maternal mastitis and the prevalence of newborn hospitalization. This analysis was conducted based the following two key points: firstly, MDPV can effectively resolve problems encountered by parturients during breastfeeding after discharge from the hospital, and ensure the effective out-of-hospital extension of the hospital's health promotion and education; and secondly, MDPV can demonstrate the correct methods of breastfeeding and nipple care by professionals, and can intuitively impart various nursing knowledge to parturients to improve their home care skills, thereby effectively reducing the incidence of mastitis and newborn hospitalization (18,19).

In addition, the self-efficacy scores of parturients in the observation group were higher than those of the control group (P<0.05), which indicated that MDPV could significantly improve the self-efficacy level of parturients after discharge. Self efficacy refers to the changing psychological characteristics related to specific situations. Mothers with higher self-efficacy will also have higher self-confidence in breastfeeding. Maternal self-efficacy is an important factor affecting the rate of exclusive breastfeeding, which is a potentially visible variable (20). Thomas thought that the self-efficacy score of pregnant women who expected exclusively breast-fed was higher than that of pregnant women who expected mixed and artificial feeding (21). Ra believes that the more knowledge a mother has about breastfeeding, the higher her breastfeeding efficiency (22). Thus, in addition to markedly improving the breastfeeding knowledge of parturients, MDPV could also help to resolve difficulties or feeding questions that are encountered after discharge from the hospital. The ability of parturients to promptly obtain professional answers and effective solutions from medical staff will ultimately increase

their self-efficacy level (23).

Conclusions

In summary, the application of MDPV to parturients with inverted nipples can improve breastfeeding rates, enhance breastfeeding knowledge, reduce the incidence of maternal mastitis and infant hospitalization rate, and improve breastfeeding self-efficacy. Thus, it is worthy of promotion.

Acknowledgments

Footnote

Reporting Checklist: The authors have completed the CONSORT reporting checklist. Available at http://dx.doi.org/10.21037/apm-21-165

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. This study was approved by the Ethics Committee of Drum Tower Hospital Affiliated to Nanjing University School of Medicine {Ethics approval number: [(2018)LC116]} and was conducted in accordance with the Declaration of Helsinki (as revised in 2013). All subjects provided informed consent.

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