

ORIGINAL RESEARCH ARTICLE

Evaluation of the effectiveness of multidimensional nursing interventions on post-caesarean section abdominal distension

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Abstract

To investigate the efficacy of a multidimensional nursing intervention combining Zusanli massage with psychological counselling and breathing exercises in alleviating post-caesarean section abdominal distension, 120 women who underwent caesarean section at Hefei Maternal and Child Health Hospital between September 2025 and March 2026 were selected as the study subjects. Participants were divided into a control group ($n=52$) and an study group ($n=68$) based on the nursing intervention protocols they actually received postoperatively. Data were collected and compared regarding the incidence of abdominal distension, indicators of gastrointestinal function recovery, postoperative pain levels, anxiety and depression status, and postoperative complications. The results showed that the incidence of postoperative abdominal distension, pain scores and anxiety and depression scores were all significantly lower in the study group than in the control group. The time taken for bowel sounds to return, flatus passage and bowel movement were all significantly shorter in the study group than in the control group, and the incidence of complications showed a downward trend. This indicates that multidimensional nursing interventions can effectively alleviate postoperative abdominal distension following caesarean section, promote gastrointestinal function and physical and mental recovery, and have positive implications for improving the quality of postpartum maternal rehabilitation (*Afr J Reprod Health* 2026; 30 [13]: 45-54).

Keywords : Zusanli acupoint massage; psychological counselling; breathing exercises; caesarean section; abdominal distension

Résumé

Afin d'évaluer l'efficacité d'une intervention infirmière multidimensionnelle combinant le massage du point d'acupuncture Zusanli, un soutien psychologique et des exercices de respiration pour soulager la distension abdominale après une césarienne, 120 femmes ayant accouché par césarienne à l'hôpital maternel et infantile de Hefei entre septembre 2025 et mars 2026 ont été sélectionnées pour cette étude. Les participantes ont été réparties en un groupe témoin ($n = 52$) et un groupe d'étude ($n = 68$) en fonction des protocoles de soins infirmiers effectivement reçus en postopératoire. Les données recueillies et comparées concernaient l'incidence de la distension abdominale, les indicateurs de rétablissement de la fonction gastro-intestinale, les niveaux de douleur postopératoire, les états d'anxiété et de dépression, ainsi que les complications postopératoires. Les résultats ont montré que l'incidence de la distension abdominale postopératoire, les scores de douleur ainsi que les scores d'anxiété et de dépression étaient tous significativement plus faibles dans le groupe d'étude que dans le groupe témoin. Les délais de réapparition des bruits intestinaux, d'émission de gaz et de reprise du transit intestinal étaient tous significativement plus courts dans le groupe d'étude, et l'incidence des complications présentait une tendance à la baisse. Ces résultats indiquent que les interventions infirmières multidimensionnelles permettent de soulager efficacement la distension abdominale après une césarienne, de favoriser le rétablissement de la fonction gastro-intestinale ainsi que la récupération physique et mentale, et contribuent positivement à l'amélioration de la qualité de la réhabilitation maternelle en post-partum (*Afr J Reprod Health* 2026; 30 [13]:45-54).

Mots-clés: massage du point d'acupuncture Zusanli ; soutien psychologique ; exercices de respiration ; césarienne ; distension abdominale

Introduction

In recent years, the rate of cesarean section in China has continued to rise to 40%-60% ¹. Surgical trauma, anesthesia and other factors can easily lead

to postoperative gastrointestinal dysfunction, manifested as defecation disorders, weakened bowel sounds, abdominal distension and abdominal pain² The incidence of abdominal distension after cesarean section is as high as 15% ³, which not only

affects maternal respiratory and circulatory function, but also delays wound healing and lactation time. It also limits activity due to pain, thereby increasing the incidence of postpartum anxiety.⁴ In severe cases, it can lead to diaphragm lifting and oppression of the inferior vena cava, which not only affects respiratory function, but also hinders blood return and increases the risk of lower extremity venous thrombosis.⁵

Interventions for postoperative abdominal distension have historically focused on single measures. Acupoint massage stimulates gastrointestinal peristaltic reflex arcs to promote postoperative intestinal recovery⁶ psychological interventions aid in improving maternal emotional states and coping mechanisms⁷ while breathing exercises enhance respiratory function and alleviate postpartum contractions. However, single interventions yield limited results: massage struggles to alleviate psychogenic bloating; psychological counselling cannot directly influence intestinal function; and breathing exercises have proven ineffective for severe gastrointestinal motility disorders. Nursing interventions are integrated throughout the entire post-operative recovery process for new mothers, enabling the systematic implementation of routine measures such as guidance on early mobility, postural management, dietary adjustments and abdominal heat therapy. These interventions directly stimulate intestinal peristalsis, promote the passage of wind and stools, and reduce the risk of intestinal distension. Consequently, a multidimensional integrated nursing intervention model is required to overcome the limitations of singular approaches and enhance postoperative recovery outcomes for mothers.⁸ Traditional Chinese Medicine theory posits that Zusanli is a pivotal acupoint for regulating the spleen and stomach and replenishing Qi and blood. Stimulating this point unblocks meridians and activates collaterals, promoting Qi and blood circulation. This not only enhances digestive enzyme secretion to strengthen gastrointestinal motility but also accelerates intestinal gas expulsion, thereby expediting gastrointestinal function recovery.^{9,10}

Based on this, this study integrates Zusanli massage, psychological counseling and respiratory training into a multi-dimensional nursing

intervention to explore its effect on improving abdominal distension after cesarean section, promoting the recovery of gastrointestinal function, and improving complications and anxiety. The aim is to reduce the incidence of postoperative abdominal distension, shorten gastrointestinal recovery time, and improve maternal rehabilitation outcomes.

Methods

Research subjects

A retrospective study was conducted involving 120 women who underwent caesarean section at Hefei Maternal and Child Health Hospital between September 2025 and March 2026. Inclusion criteria were: (1) aged 20–50 years; (2) Single-fetus pregnancy at ≥ 37 weeks' gestation; (3) Clear indications for cesarean section performed under combined spinal-epidural anaesthesia with lower uterine segment incision; (4) Complete clinical records including postoperative abdominal distension incidence, gastrointestinal recovery indicators, psychological state scores, and complication occurrence; (5) Absence of contraindications for Zusanli acupoint massage or respiratory training.

The exclusion criteria: (1) Pre-existing gastrointestinal disorders, digestive dysfunction, intestinal obstruction, or other conditions affecting gastrointestinal function; (2) Severe pregnancy complications such as underlying medical conditions; (3) Severe surgical complications during the procedure, including major haemorrhage, septic shock, or organ injury; (4) History of psychiatric disorders or cognitive impairment; (5) Incomplete clinical documentation; (6) Postpartum transfer to another department, early discharge, or loss to follow-up.

Grouping method

This study grouped participants according to the nursing intervention protocols they actually received following caesarean section. Women admitted for caesarean section between September 2025 and 30 November 2025 who received only routine obstetric care post-operatively were included in the control group (n=52); Pregnant

women admitted for caesarean section between 1 December 2025 and 30 March 2026 were included in the study group (n=68). For this group, our hospital's obstetrics department implemented a new clinical nursing protocol that integrated Zusanli massage, psychological counselling and breathing exercises with standard care. Caesarean sections for both groups of mothers were performed by the same medical team during the two time periods. The anaesthetic method was uniformly combined spinal-epidural anaesthesia, and the postoperative pain management protocol was intravenous patient-controlled analgesia. The basic nursing procedures remained consistent, with no differences in protocols or procedures, thereby ensuring the comparability of the interventions between the groups.

Obstetric routine nursing: the operation was completed by nurses with professional obstetric nursing qualification, including dynamic monitoring of postoperative vital signs¹², abdominal incision nursing and standard dressing change, step-by-step diet guidance (gradual transition of liquid diet 6 hours after operation, avoiding gas-producing food)¹³, basic activity guidance (assisting turning over in bed 24 hours after operation and guiding moderate activity out of bed), health education after caesarean section, basic nursing of postpartum breast and lactation¹⁴, and symptomatic treatment of drugs according to the doctor's advice. All interventions were completed during hospitalization until discharge.

Multidimensional nursing interventions: Zusanli acupoint massage commenced 6 hours post-surgery. Using the pad of the thumb, circular pressure was applied to the bilateral Zusanli points on both lower limbs. Each session lasted 5 minutes per side, alternating sides, twice daily, ceasing after the first passage of wind. A sensation of local soreness, numbness, distension, and heaviness was desirable.¹⁵ Psychological counselling commenced within 24 hours post-surgery, conducted once daily for 20–30 minutes over three consecutive days. This involved emotional assessment and acceptance, information support, and relaxation training to alleviate maternal anxiety.¹⁶ Respiratory training commenced 6 hours postoperatively, administered twice daily for 10–15 minutes per session, continuing until the patient achieved

unassisted ambulation. Instructions focus on diaphragmatic breathing and coughing coordination exercises to enhance diaphragmatic movement and stimulate intestinal peristalsis.¹⁷ All interventions were completed during the patient's hospital stay until discharge.

Data collection

The clinical data of the two groups of parturients were collected through the hospital electronic medical record system and nursing record sheet, as follows:

General information: age, body mass index (BMI), parity, cesarean section indications (such as abnormal fetal position, fetal distress, cephalopelvic disproportion, scar uterus, etc.), operation time, intraoperative blood loss, etc.

Incidence of abdominal distension: The number of cases, timing, and severity of abdominal distension occurring within 48 hours postoperatively were recorded. Severity is assessed using a four-grade classification: Level 1 (no distension, abdomen flat and soft, no discomfort reported); Grade 2 (mild distension, patient reported slight abdominal fullness but tolerable, no significant abdominal distension); Grade 3 (moderate distension, abdominal protrusion, marked discomfort requiring clinical intervention such as rectal tube evacuation or medication); Grade 4 (severe distension, marked abdominal protrusion, intense discomfort accompanied by dyspnoea, worsening abdominal pain, or loss of bowel sounds)¹⁸

Gastrointestinal function recovery indicators: Time to return of bowel sounds: Auscultation around the umbilicus commences 4 hours postoperatively, repeated every 4 hours until bowel sounds return to normal (4–5 sounds per minute, moderate loudness). Record the time from the first detection of bowel sounds by the mother to the return of normal bowel sounds.¹⁹ Time of first flatus: Record the time of the patient's first perceived anal flatus postoperatively, self-reported by the patient and confirmed by nursing staff, calculated from the time of surgical completion.²⁰ Time of first bowel movement: Record the time of the first postoperative bowel movement, calculated from the time of surgical completion.²

Postoperative pain intensity: Postoperative pain intensity was assessed at 6 hours, 24 hours, and 48 hours post-surgery using the Visual Analogue Scale (VAS).²² This involved a 10-point sliding scale measuring 10 cm in length, marked with '0' at one end and '10' at the other, representing the respective levels of pain intensity. Mothers were instructed to subjectively select their pain score along this scale, with higher scores indicating more severe pain.

Anxiety and depression status: At 48 hours post-surgery and prior to discharge, anxiety levels were assessed using the Hamilton Anxiety Rating Scale (HAMA)²³. This scale employed a five-point scoring system ranging from 0 to 4, with higher scores indicating more severe anxiety. At 48 hours post-surgery and prior to discharge, the Hamilton Depression Rating Scale (HAMD)²⁴ was employed to assess depressive severity. This scale utilised a five-point scoring system ranging from 0 to 4, with higher scores indicating greater depressive severity.

Postoperative complications: All complications occurring during hospitalisation in both groups of mothers were recorded, including deep vein thrombosis of the lower limbs, incisional infection, urinary retention, postpartum haemorrhage (bleeding volume ≥ 500 mL within 24 hours), and intestinal obstruction. The complication incidence rate (number of complications/total number of cases $\times 100\%$) was calculated.

Statistical analysis

All data analyses were performed using Statistical Product and Service Solutions 27.0 (IBM, Armonk, NY, USA). The Kolmogorov-Smirnov test was used to evaluate the normality of continuous variables. If the variable conforms to normality, it is expressed as mean $\pm$ standard deviation (SD). If the variable does not conform to normality, it is expressed as median (interquartile range). Independent sample t test or Mann-Whitney U test was used for comparison between groups. Count data were expressed as frequency and percentage [n (%)]. Chi-square test or Fisher's exact probability method was used for comparison between groups. Rank data were analyzed by Wilcoxon rank-sum test. The graph was made using GraphPad Prism 10 software (GraphPad Software, La Jolla, California,

USA). $P < 0.05$ indicated that the difference was statistically significant.

Ethical considerations

This study adhered to the Declaration of Helsinki¹¹ and was approved by the Ethics Committee of Hefei Maternal and Child Health Hospital, ethics approval number: JYLL2026KT04

Results

Comparison of general data between the two groups of parturients

In this study, comparisons between the two groups of mothers revealed no statistically significant differences in age, BMI, birth times, caesarean section indication, surgical duration, or intraoperative blood loss. Baseline characteristics were balanced between groups, ensuring comparability (Table 1).

Comparison of postoperative abdominal distension between the two groups

The incidence of abdominal distension within 48 hours post-surgery was 41.2% in the study group, lower than the 65.4% observed in the control group, with a statistically significant difference. The onset time of abdominal distension in the study group was (31.3 $\pm$ 4.5) hours, later than the control group's (26.6 $\pm$ 4.5) hours, with a statistically significant difference.

Comparison of abdominal distension severity grades revealed that mild distension (level 1 and 2) predominated in the study group, whereas moderate-to-severe distension (level 3 and 4) was more prevalent in the control group, with a statistically significant difference (Table 2).

Comparison of postoperative gastrointestinal function recovery indexes between the two groups

The study group exhibited significantly shorter times to bowel sound recovery (10.6 $\pm$ 2.7) hours, first flatus (21.7 $\pm$ 3.9) hours, and first bowel movement (38.2 $\pm$ 5.5) hours compared to the

Table 1: Comparison of baseline data

Indicator	Study Group (n=68)	Control Group (n=52)	χ^2/t	P
Age, year, mean±SD	30.4±3.4	29.3±3.2	1.9	0.1
BMI, kg/m ² , mean±SD	22.6±2.3	22.5±2.2	0.3	0.7
Birth times, n(%)			0.5	0.5
Primiparous	41 (60.3)	28 (53.9)		
Multiparous	27 (39.7)	24 (46.1)		
Cesarean section indication, n(%)			1.0	0.8
Abnormal foetal presentation	19 (27.9)	19 (36.5)		
Foetal distress	24 (35.3)	16 (30.8)		
Cephalopelvic disproportion	14 (20.6)	10 (19.2)		
Scar uterus	11 (16.2)	7 (13.5)		
Surgical duration, min, mean±SD	45.8±8.4	47.2±7.7	0.9	0.4
Blood loss, mL, mean±SD	271.6±35.8	263.9±35.8	1.2	0.2

SD, standard deviation; BMI, body mass index.

Table 2: Comparison of postoperative abdominal distension incidence

Indicator	Study Group (n=68)	Control Group (n=52)	$\chi^2/t/Z$	P
Abdominal distension, n(%)			6.9	<0.1
Yes	28 (41.2)	34 (65.4)		
No	40 (58.8)	18 (34.6)		
Abdominal distension time, h, mean±SD	31.3±4.5	26.6±4.5	4.114	<0.1
Degree of abdominal distension, n(%)			2.013	<0.1
Level 1	8 (28.6)	5 (14.7)		
Level 2	12 (42.9)	11 (32.4)		
Level 3	6 (21.4)	12 (35.3)		
Level 4	2 (7.1)	6 (17.7)		

SD, standard deviation

control group, with all differences being statistically significant (Table 3).

Comparison of pain scores between the two groups at different time points after operation

At 6 h after operation, there was no significant difference in VAS pain score between the two groups. At 24 h and 48 h after operation, the VAS pain scores of the study group were significantly lower than those of the control group, and the differences were statistically significant. The scores

of the two groups showed a downward trend with time, and the pain relief of the study group was more obvious (Table 4).

Comparison of postoperative anxiety and depression between the two groups

The HAMA (25.4±3.8), HAMD score (12.4±2.5) at 48 h after operation, HAMA (14.5±3.1) and HAMD score (6.1±1.8) before discharge in the study group were significantly lower than those in the control group. The HAMA and HAMD scores of the two

Table 3: Comparison of postoperative gastrointestinal function recovery indicators

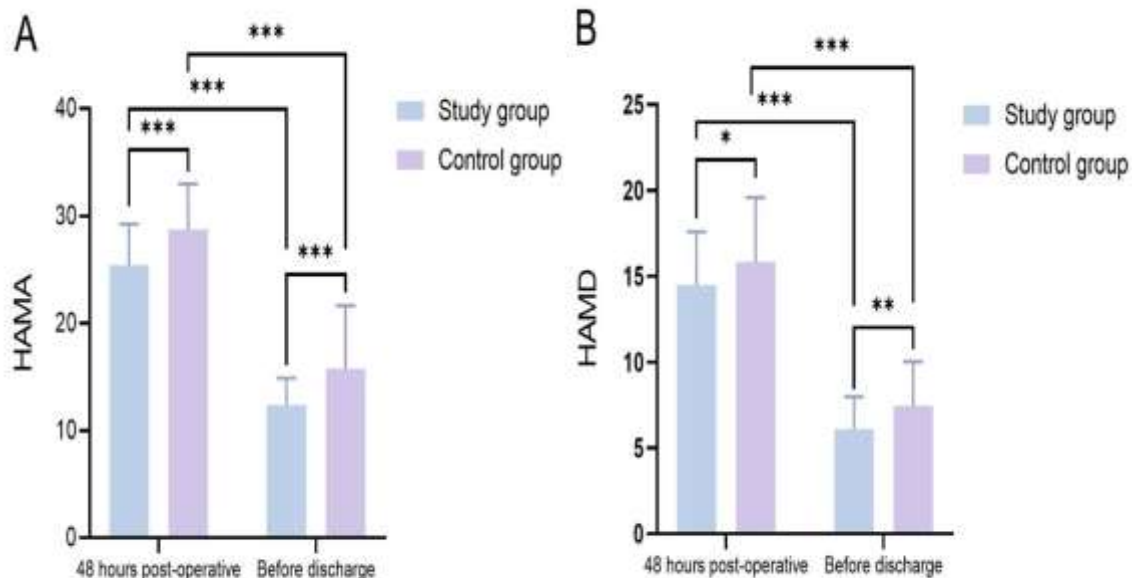
Indicator	Study Group (n=68)	Control Group (n=52)	t	P
Bowel sound recovery time, h, mean±SD	10.6±2.7	13.3±2.5	5.7	<0.1
First exhaust time, h, mean±SD	21.7±3.9	25.8±3.1	6.2	<0.1
First defecation time, h, mean±SD	38.2±5.5	40.7±6.4	2.3	<0.1

SD, standard deviation.

Table 4: Comparison of pain scores at different time points post-surgery

Indicator	Study Group (n=68)	Control Group (n=52)	T	P
VAS-6 h, mean±SD	6.0±1.3	5.9±1.3	0.4	0.7
VAS-24 h, mean±SD	3.7±1.1	4.1±0.9	2.2	<0.1
VAS-48 h, mean±SD	2.4±0.9	3.0±0.9	3.9	<0.1

SD, standard deviation; VAS, Visual analogue scale.



groups before discharge were lower than those at 48 h after operation, and the emotional improvement effect of the study group was more significant (Figure 1).

Comparison of postoperative complications between the two groups

The overall incidence of postoperative complications was 8.8% in the study group and

21.2% in the control group; the incidence in the study group was lower than that in the control group, with the difference approaching statistical significance. Notably, the incidence of complications affecting the reproductive system and postpartum recovery—such as urinary retention, postpartum haemorrhage and surgical site infection—was lower in the study group than in the control group (Table 5).

Table 5: Comparison of the incidence of postoperative complications

Type	Study Group (n=68)	Control Group (n=52)	χ^2	P
Deep vein thrombosis of the lower limbs	1 (1.5)	2 (3.9)	0.1	0.8
Incision infection	2 (2.9)	3 (5.8)	0.1	0.8
Urinary retention	0 (0.0)	2 (3.9)	0.8	0.2
Postpartum haemorrhage	1 (1.5)	2 (3.9)	0.1	0.8
Intestinal obstruction	2 (2.94)	2 (3.9)	0.1	0.8
Overall incidence rate	6 (8.8)	11 (21.2)	3.7	0.1

Discussion

This study integrated Zusanli massage, psychological counselling and breathing exercises into a multidimensional nursing intervention programme for post-caesarean section care. The results showed that the intervention group demonstrated significantly better outcomes than the control group in terms of the incidence of postoperative abdominal distension, the severity of abdominal distension, the time taken for gastrointestinal function to recover, pain scores, and anxiety and depression scores, indicating that this programme can effectively promote recovery following a caesarean section.

From the perspective of reproductive health, postpartum maternal recovery involves uterine involution, gastrointestinal function, psychological state and overall quality of life. The occurrence of abdominal distension after cesarean section is related to multiple factors such as surgical trauma, inhibition of intestinal peristalsis by anesthetic drugs, decrease of gastrointestinal motility caused by postoperative bed rest and maternal psychological stress.^{25,26} The results of this study indicate that the incidence, onset time and severity of postoperative bloating were significantly better in the study group than in the control group. Massage of the Zusanli acupoint stimulates the gastrointestinal motility reflex arc, promoting the secretion of digestive enzymes and the expulsion of gas.²⁷

However, massage alone is unlikely to alleviate bloating caused by psychological factors; psychological counselling indirectly promotes the recovery of gastrointestinal function by reducing stress levels and alleviating sympathetic nervous system tension²⁸. Breathing exercises provide mechanical stimulation to the intestines by

increasing diaphragmatic movement and act in synergy with psychological counselling²⁹.

The recovery time of bowel sounds, first exhaust and first defecation in the study group were significantly shorter than those in the control group, indicating that the recovery of intestinal peristalsis was accelerated, and the parturients could return to normal diet earlier, which was conducive to nutritional intake and physical recovery, and accelerated the overall rehabilitation process^{30,31}. At the same time, the reduction of abdominal distension reduces the risk of complications such as incision traction pain, urinary retention and intestinal obstruction caused by increased abdominal pressure^{32,33}. In this study, the incidence of total postoperative complications in the intervention group was lower than that in the control group; although the difference was not statistically significant, a trend towards improvement was observed. This suggests that multidimensional nursing interventions may have potential value in preventing postoperative complications following caesarean section; this could be further validated by increasing the sample size in future studies.

Postoperative pain and psychological stress are indirect factors that exacerbate abdominal distension and delay recovery in women who have undergone caesarean sections. Massage of the Zusanli acupoint activates the endogenous pain relief system and promotes the release of endorphins³⁴; breathing exercises stimulate intestinal peristalsis through diaphragmatic movement and alleviate physical pain; and psychological counselling effectively alleviates anxiety and depression³⁵. This study demonstrates that the improvement in postoperative VAS pain scores and pre-discharge HAMA and HAMD scores in the study group was significantly greater

than that in the control group. This indicates that pain relief and emotional improvement form a positive feedback loop: emotional relief lowers the pain perception threshold in postpartum women, whilst reduced pain alleviates psychological stress. Together, these factors reduced gastrointestinal dysfunction caused by physical discomfort and psychological anxiety, thereby not only alleviating the severity of abdominal distension but also facilitating early ambulation and promoting gastrointestinal motility.

The primary strength of this study lies in its targeted design for the multifactorial pathogenesis of post-caesarean section abdominal distension. Previous interventions focused on a single measure, such as acupoint massage, psychological counselling, or respiratory training, but failed to comprehensively address the interactive effects of gastrointestinal motility disorders, psychological stress, and respiratory dysfunction on postoperative recovery. This study integrated traditional Chinese medicine acupoint stimulation, psychological support, and functional exercise, constructing a holistic intervention system that targeted multiple key links in the recovery process. This integrated approach overcame the one-sidedness of single interventions and achieved a synergistic effect on promoting intestinal peristalsis, relieving pain, and improving mental status. Secondly, this study adopted a rigorous retrospective research design with clear inclusion and exclusion criteria, ensuring the homogeneity of the research objects. The two groups were treated by the same medical team, with consistent anesthetic methods and basic nursing protocols, which effectively controlled for confounding factors such as surgical technique and routine care. The standardization of the intervention process and the completeness of data collection improved the reliability and validity of the research results, providing a solid evidence basis for clinical promotion. In addition, this study comprehensively evaluated the intervention effect from multiple dimensions, including objective indicators such as time to first flatus, time to first bowel movement, and incidence of abdominal distension, as well as subjective indicators such as pain intensity and psychological status. This multi-dimensional evaluation system reflected the holistic concept of nursing care, which was more in line with the actual

needs of post-caesarean section maternal rehabilitation.

This study also has certain limitations. Firstly, regarding the study design, this study employed a retrospective historical control design. The study group and control group comprised women admitted during different time periods, rather than being randomly assigned. Consequently, differences may exist between the two groups in terms of admission timing, nursing practice environments, and healthcare professionals' operational practices. This poses risks of selection bias and time-related confounding factors. Although baseline data were balanced between the two groups, it remains impossible to completely rule out the interference of uncontrolled confounding factors on the results. Secondly, regarding sample size and representativeness, the sample size was relatively small. All study participants were from Hefei Maternal and Child Health Hospital, resulting in a high degree of geographical homogeneity within the sample, which limits the generalisability of the findings. Furthermore, the small sample size may have led to certain outcome measures (such as the incidence of complications) showing a trend towards improvement but failing to reach statistical significance. Future multi-centre, large-scale studies are required to validate the generalisability of this study's conclusions and enhance statistical power. Thirdly, regarding the follow-up period, this study only followed up until the mothers' discharge from hospital and did not track long-term postpartum outcomes, such as the recovery of gastrointestinal function over a longer period, the incidence of postpartum depression, duration of lactation, exclusive breastfeeding rates, and uterine involution. Future studies should extend the follow-up period and include more outcome measures reflecting postpartum maternal recovery. Fourthly, regarding the intervention measures, the duration and frequency of the multidimensional nursing intervention in this study were determined empirically, and there is a lack of comparative research on the effects of interventions with different massage durations and frequencies. Future dose-response studies could be conducted to further enhance nursing outcomes and achieve individualised interventions. Additionally, this

study did not quantitatively assess adherence to the intervention measures, which may have affected the accurate assessment of the intervention's effectiveness.

Fifth, regarding the control of confounding factors, although the two groups were balanced and comparable in terms of demographic and clinical characteristics, factors such as levels of social support, family environment, maternal personality traits and previous psychological status may have influenced the study outcomes. Future research should collect data on more potential confounding factors and employ methods such as multivariate regression or propensity score matching to control for them in the analysis.

Conclusion

The implementation of a multidimensional nursing intervention combining Zusanli massage, psychological counselling and breathing exercises can significantly reduce the incidence of post-caesarean section abdominal distension, delay the onset of distension, alleviate its severity, and shorten the time taken for bowel sounds to return, as well as for the first flatus and bowel movement. It can also alleviate post-operative pain in mothers and improve post-operative anxiety and depressive symptoms. This multidimensional nursing intervention demonstrates effective improvement and control of post-caesarean section abdominal distension, optimises postoperative recovery indicators for mothers, and enhances overall nursing outcomes, thereby holding clinical value for wider application.

Author contributions

Huang Li conceived and designed the study, collected and analyzed the data, and drafted the manuscript. Zhu Hong Feng contributed to the study supervision, interpretation of data, critical revision of the manuscript, and final approval of the version to be published. Both authors read and approved the final manuscript and agree to be accountable for all aspects of the work.

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Conflict of interests

The authors declare no competing interests.

Data availability

All experimental data included in this study can be obtained by contacting the corresponding author if needed.

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