ORIGINAL RESEARCH

A Study on the Effects of Esketamine Combined with Comprehensive Nursing Intervention on Postoperative Pain, Postpartum Depression, and Quality of Life in Women Undergoing Cesarean Section

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ABSTRACT

Objective • The objective of this study was to investigate and analyze the effects of esketamine combined with comprehensive nursing intervention on postoperative pain, postpartum depression, and quality of life in women undergoing cesarean section.

Methods • This study included 140 parturients who underwent cesarean section in The Second Hospital of Dalian Medical University (from May 2021 to May 2022). The participants were divided into two groups: the control group and the study group, based on random allocation. The control group received traditional treatment and routine nursing care, while the study group received esketamine combined with comprehensive nursing intervention. Postoperative pain, postpartum depression, and quality of life were assessed using the Visual Analog Scale (VAS), Edinburgh Postnatal Depression Scale (EPDS), and SF-36 questionnaire, respectively.

Results • The two groups had no significant differences in baseline data ($P > .05$). The postoperative VAS scores of the study group (1.86 ± 0.65) were lower than those of the control group (3.04 ± 0.79) ($P < .05$). The postoperative EPDS scores of the study group (5.23 ± 1.07) were lower than those of the control group (8.11 ± 1.84) ($P < .05$). The postoperative physiological recovery of the study group was superior to that of the control group ($P < .05$). The postoperative SF-36 scores of the study group were higher than those of the control group ($P < .05$).

Practical Implications • The combined use of esketamine and comprehensive nursing in cesarean sections offers practical benefits for patient care. Notably, it leads to reduced postoperative pain, as indicated by lower VAS scores, promising improved satisfaction for parturients. The intervention also demonstrates a positive impact on postpartum mental health, with lower EPDS scores suggesting potential benefits in alleviating depression. Moreover, the observed accelerated physiological recovery in the study group, along with shorter hospital stays, signifies efficiency gains in healthcare delivery. This not only optimizes resource utilization but also contributes to an enhanced overall recovery experience for women undergoing cesarean sections.

Conclusion • The application of esketamine combined with comprehensive nursing intervention after cesarean section has a positive impact on the pain relief, postpartum depression, and quality of life of parturients. This study provides new insights and guidance for clinical practice, potentially enhancing the postoperative experience of women undergoing cesarean section. These findings furnish healthcare professionals with valuable insights and guidance, fostering a nuanced and improved standard of care in obstetric practices. (*Altern Ther Health Med.* 2024;30(10):70-77).

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INTRODUCTION

Cesarean section, also known as c-section, is a surgical method of delivery where the fetus is delivered by making an incision in the lower abdomen of the pregnant woman and removing the fetus from the uterus. Compared to vaginal delivery, cesarean section is often chosen under the circumstances such as obstetric and gynecologic diseases, fetal abnormalities, maternal clinical conditions, or placental positioning that pose higher risks for vaginal delivery or due to medical or personal considerations of the mother.[1,2] As a commonly used method of childbirth, cesarean section has seen an increase in its prevalence worldwide in recent years. While cesarean section can alleviate some of the pain and risks associated with childbirth, issues related to postoperative pain, postpartum depression, and quality of life remain significant concerns. During the recovery period, postpartum

women may experience intense pain, emotional fluctuations, and physical discomfort, all of which can influence their quality of life and psychological well-being.[3,4]

Postpartum depression is a prevalent psychological disorder that not only affects the well-being of the mother but also has far-reaching implications for the health of the newborn and family harmony.[5,6] Therefore, finding effective interventions to alleviate postoperative pain and emotional distress among postpartum women and enhance their quality of life holds crucial clinical significance.

Esketamine, a derivative of ketamine, takes center stage in our study due to its unique pharmacological characteristics. As an *N*-methyl-D-aspartate (NMDA) receptor antagonist, esketamine not only offers potent pain relief, crucial for postpartum women recovering from cesarean sections, but also shows promise in mood stabilization. Cesarean sections often result in postoperative pain, impacting the comfort of women during recovery. Esketamine's analgesic properties address this challenge, providing a more comfortable postoperative experience. Beyond pain management, esketamine's influence on NMDA receptors suggests potential mood-stabilizing effects, offering a holistic approach to enhance the well-being of postpartum women. Against this backdrop, pharmacological pain management and comprehensive nursing interventions have become areas of significant interest. Esketamine, as an N-methyl-D-aspartate receptor antagonist, has found widespread use in anesthesia and pain management. Recent research suggests that esketamine not only exhibits superior analgesic effects but may also have positive impacts on mood stabilization.[7,8] However, there is limited in-depth research, particularly regarding the application of esketamine in postpartum women undergoing cesarean section, especially when combined with comprehensive nursing interventions.

Despite the growing interest in esketamine's potential applications, there exists a notable gap in the literature concerning its specific use in postpartum women undergoing cesarean sections. Current research on esketamine predominantly focuses on anesthesia and pain management in various settings, with limited exploration in the context of obstetric procedures. The unique physiological and psychological aspects of the postpartum period, especially after cesarean section, require tailored interventions. Existing literature lacks comprehensive investigations into esketamine's effects on postoperative pain, postpartum depression, and overall quality of life in this specific demographic. Our study aims to bridge this gap by delving into the uncharted territory of esketamine application in the context of cesarean section recovery. Through rigorous research design and data analysis, we aspire to contribute crucial insights that not only address existing limitations but also pave the way for more targeted and effective interventions for postpartum women.

The primary objective of this study is to investigate the effects of esketamine combined with comprehensive nursing intervention on postoperative pain, postpartum depression, and quality of life in women undergoing cesarean section. Through comparative analysis between the study and control groups, we seek to further understand the practical outcomes of this intervention, providing more scientifically informed guidance for clinical practice and improving the comfort and psychological well-being of postpartum women.

This research is crucial in improving the postoperative experience of postpartum women following cesarean sections. Focusing on esketamine and comprehensive nursing intervention, our study aims to enhance pain management, address postpartum depression, and elevate the overall quality of life. The potential benefits include effective pain relief through esketamine and holistic support from nursing interventions. This approach not only improves the recovery process for postpartum women but also positively impacts family dynamics.

With these goals in mind, the subsequent sections will expound on our study's methodology, offering insights into the research design and methods applied to assess the effects of esketamine combined with comprehensive nursing intervention on postoperative outcomes in women undergoing cesarean section.

OBJECTS AND METHODS

Study Subjects

A sample size of 140 based on power analysis, feasibility, and alignment with similar studies. This study included postpartum women who underwent cesarean section in our hospital (from May 2021 to May 2022), with a total of 140 cases after excluding subjects who did not meet the complete inclusion criteria. For the random allocation process, we employed a computer-generated randomization sequence to divide the 140 parturients into two equal groups: the study group and the control group. Each participant was assigned a unique identifier, and the randomization algorithm was applied to these identifiers. This method ensured that each participant had an equal chance of being assigned to either group, thereby minimizing selection bias. By using computer-generated randomization, this study aimed to eliminate any systematic or predictable patterns in participant allocation, reducing the risk of selection bias. Random assignment helps create comparable groups at baseline, balancing both known and unknown confounding factors between the study and control groups. The allocation was concealed from both the participants and the researchers involved in assessing the outcomes to maintain the study's integrity. The medication and nursing methods differed between the two groups. The control group received traditional treatment and routine care, while the study group received esketamine combined with comprehensive nursing intervention. All subjects were informed about this study and voluntarily signed an informed consent form. Our hospital's Ethics Committee approved this study.

Inclusion Criteria

Inclusion criteria: (1) Subjects who underwent cesarean section surgery at our hospital; (2) American Society of Anesthesiologists (ASA) classification I or II; (3) routine

antenatal examinations, including color Doppler ultrasound and/or magnetic resonance imaging, showing normal pregnancy status.

Exclusion criteria: (1) Emergency cesarean section surgery; (2) the presence of coagulation disorders; (3) uterine malformations; (4) pre-existing diagnosed depression; (5) drug allergies; (6) the presence of preeclampsia or eclampsia, etc.

Intervention Methods

Preoperatively, the parturients were instructed to refrain from eating and drinking following routine protocol. A peripheral venous line was established for the parturient in the operating room, and electrocardiographic monitoring was connected to observe the cardiac status. Local anesthesia was administered, and radial artery catheterization was performed to monitor the direct arterial pressure of the parturient. Concurrently, internal jugular vein catheterization was conducted to ensure the stability of the parturient. The parturient was positioned in a right lateral decubitus and received lumbar epidural anesthesia at the L2-3 or L3-4 intervertebral space. After sterilization and sterile draping, a lumbar puncture was performed, followed by the insertion of a spinal needle to ensure the proper flow of cerebrospinal fluid. Subsequently, 2 ml of 0.5% bupivacaine was injected for subarachnoid anesthesia. An epidural catheter was then placed 3 cm into the epidural space to maintain anesthesia. The level of anesthesia was controlled at a specific thoracic level. After anesthesia induction, the parturient was positioned supine with a 30° left tilt to ensure smooth progress of the surgery.

The control group received traditional treatment, which included the intravenous injection of 0.2 mg/kg 0.9% sodium chloride, followed by continuous intravenous infusion at 0.25 mg/kg per hour until the end of surgery. Routine care encompassed the following:

Vital Signs Monitoring: Continuous monitoring of heart rate, blood pressure, and respiration to ensure stable postoperative recovery.

Pain Management: Administration of standard analgesics as needed and regular assessment of pain levels.

Wound Care: Regular inspection and care of surgical incisions, including dressing changes and monitoring for signs of infection.

Fluid and Nutritional Support: Managing fluid intake and providing a balanced diet to aid recovery.

Mobility and Rehabilitation: Encouragement of early ambulation and guidance on postoperative exercises to aid in recovery.

Postoperative Instructions: Education on care at home, including wound care, medication management, and signs of complications.

Breastfeeding Support: Basic guidance on breastfeeding techniques and positions and assistance with initial breastfeeding attempts.

The intervention for the study group involved the following steps: Esketamine, supplied by Jiangsu Hengrui Medicine Co., Ltd., was introduced intravenously following fetal delivery. The administration commenced with an initial intravenous dose, followed by a sustained intravenous infusion at a rate of 0.25 mg/kg per hour until the completion of the surgical procedure. This approach aimed to establish a consistent and controlled delivery of esketamine, with the goal of maximizing its analgesic efficacy and potential mood-stabilizing effects throughout the postoperative phase.

Preoperative Education: Prior to the cesarean section, nursing staff assisted the parturients in completing necessary routine examinations and provided detailed health education. This included explaining the surgical procedure and potential issues that might arise. During this process, the nursing staff attentively listened to the parturients' concerns and patiently addressed them to alleviate their anxiety.

Psychological Support: Cesarean section surgery, with its inherent trauma, impacts not only the physical well-being of the parturients but also their psychological state. Therefore, nursing staff closely monitored emotional changes and offered psychological counseling as needed. They emphasized to expectant mothers the importance of maintaining a positive attitude for the baby's well-being. Detailed explanations of the surgical plan and prognosis were given to enhance the parturients' confidence and alleviate their apprehensions.

Rehabilitation Guidance: Given the use of anesthesia and postoperative pain associated with cesarean section surgery, nursing staff provided postpartum rehabilitation guidance. Parturients were encouraged to engage in early ambulation to facilitate postoperative recovery.

Dietary Counseling: Given the significant energy expenditure during childbirth, parturients require nutritional replenishment. The nursing staff offered dietary guidance, encouraging the consumption of various foods such as bone broth, crucian carp soup, and pig's trotter soup to ensure calcium and vitamin intake, which is beneficial for recovery.

Breastfeeding Guidance: Within 30 minutes after delivery, nursing staff guided parturients through skin-to-skin contact and provided detailed instructions on breastfeeding techniques. Information regarding nipple care was shared to promote proper pre- and post-feeding hygiene practices and prevent nipple dryness and cracking. Additionally, parturients were instructed to use warm compresses to stimulate blood circulation in the breasts and aid milk secretion.

Pain Management: Postoperatively, parturients were advised to minimize the use of analgesic medications. The nursing staff recommended acupressure massage, warm foot baths, and other methods to alleviate postoperative pain. Distraction techniques, such as playing soothing music or engaging in conversation, were employed to divert attention and enhance pain tolerance.

Prevention of Urinary Retention: Nursing staff encouraged early self-voiding for parturients to prevent urinary retention. Simultaneously, they guided parturients to hydrate appropriately to increase urine output, promoting

bladder pressure and facilitating urine elimination. Local warm compresses and warm water cleansing were suggested to aid in urination.

Outcome Measures

Postoperative Pain: Postoperative pain levels of the parturients at 2, 4, 6, 12, and 24 hours were assessed using the Visual Analog Scale (VAS) score. The VAS score criteria were as follows: 0 points indicating no pain, 1-3 points indicating mild pain, 4-6 points indicating moderate pain, and 7 points or more indicating severe pain.

Postpartum Depression: The Edinburgh Postnatal Depression Scale (EPDS) was employed to assess the level of postpartum depression among the parturients at the 6th week postpartum. The EPDS total score ranges from 0 to 30, with a score exceeding 9 indicating the presence of depressive mood disorder. A higher score correlates with a more severe level of depression.

Quality of Life: Physiological recovery-related indicators, including the time of first bowel movement, time of first ambulation, and duration of hospitalization, were recorded. Additionally, the Quality of Life questionnaire (SF-36) was utilized to analyze the postoperative quality of life level among the parturients. A higher score on the SF-36 indicates a better quality of life for the patients. The SF-36 questionnaire serves as a comprehensive tool, delving into various dimensions of an individual's health-related quality of life. It encompasses eight primary domains, each offering unique insights into different aspects of well-being. Firstly, it evaluates Physical Functioning, shedding light on an individual's capability to perform physical activities and handle daily tasks. The questionnaire then assesses Role Limitations Due to Physical Health, providing an understanding of how physical health issues may impact one's ability to fulfill work and daily role responsibilities. Bodily Pain is another crucial domain, aiming to measure both the intensity and implications of pain on overall well-being. The survey then delves into the broader spectrum of health perception through General Health, encompassing both physical and mental aspects. Vitality (Energy/Fatigue) comes into play, gauging an individual's energy levels and overall vitality. The survey further explores Social Functioning, examining the influence of health on one's participation in social activities and relationships. The questionnaire proceeds to scrutinize Role Limitations Due to Emotional Health, evaluating the extent to which emotional well-being may affect one's ability to fulfill work and daily role responsibilities. Lastly, the domain of Mental Health is explored, offering insights into emotional well-being, encompassing factors such as mood and psychological distress. By delving into these diverse domains, the SF-36 questionnaire provides a multidimensional perspective on an individual's health status. Its versatility and comprehensive nature make it a widely utilized instrument in health outcomes research and clinical practice.

Data Analysis

In this study, we employed a comprehensive and methodical approach to data analysis, using a range of statistical tests to ensure the accuracy and validity of our findings:

Descriptive Statistics: We calculated means and standard deviations for continuous variables such as age, BMI, VAS scores, EPDS scores, and SF-36 scores. These statistics provided a clear overview of the baseline characteristics and outcome measures.

Independent Samples *t* Test: This test was applied to compare the means of continuous variables between the study and control groups. It was particularly used for analyzing differences in VAS scores, EPDS scores, and SF-36 scores, providing insights into the interventions' effectiveness in pain relief, depression management, and quality of life enhancement.

Chi-Square Test (χ^2): For categorical variables, the Chi-square test was employed to assess differences in proportions or distributions between the groups, ensuring a robust analysis of categorical data.

ANOVA (Analysis of Variance): ANOVA was used, especially for data on repeated measures, like the VAS scores taken at multiple time intervals. This helped in determining if there were any statistically significant differences in pain scores over time between the two groups.

Significance Level: A significance level of $P < .05$ was consistently used to determine statistical significance, indicating that the probability of the observed differences occurring by chance was less than 5%.

The data were organized and analyzed using SPSS 26.0 software, and GraphPad Prism 8 was utilized for image processing. Careful consideration was given to the choice of statistical methods in line with the study's objectives. Descriptive statistics, such as means and standard deviations, offered a clear snapshot of baseline characteristics. The independent samples t-test facilitated a comparison of means for continuous variables between the study and control groups, gauging the effectiveness of interventions. The Chi-square test assessed differences in categorical variables, ensuring a comprehensive analysis of demographic characteristics. ANOVA was applied for data with repeated measures, like VAS scores over time.

RESULTS

Baseline Characteristics

As presented in Table 1, in the control group, there were 70 parturients with ages ranging from 24 to 28 years, with a mean age of 25.41 ± 2.77 years. The average BMI was 26.11 ± 3.08 kg/m^2, gestational age was 38.07 ± 2.94 weeks, ASA grade I was observed in 45 cases, ASA grade II in 25 cases, and primiparity in 51 cases, multiparity (2 times) in 18 cases, and multiparity (3 times) in 1 case. In the study group, there were 70 parturients with ages ranging from 23 to 30 years and a mean age of 25.87 ± 2.65 years. The average BMI was 25.99 ± 3.14 kg/m^2, gestational age was 37.96 ± 2.89 weeks, ASA grade I was observed in 48 cases, ASA grade II in 22 cases, and

primiparity in 49 cases, multiparity (2 times) in 21 cases, and no cases with multiparity (3 times). There were no significant differences in baseline characteristics between the two groups, indicating comparability ($P > .05$). Refer to Table 1.

Postoperative Pain Relief

As shown in Figure 1, in the control group, the VAS scores of parturients at 2 hours (5.11 ± 1.23), 4 hours (4.82 ± 1.01), 6 hours (4.36 ± 1.12), 12 hours (3.62 ± 0.85), and 24 hours (3.04 ± 0.79) were recorded. In the study group, the VAS scores of parturients at 2 hours (4.01 ± 0.85), 4 hours (3.31 ± 0.94), 6 hours (2.77 ± 0.69), 12 hours (2.28 ± 0.71), and 24 hours (1.86 ± 0.65) were recorded. The study group exhibited significantly lower VAS scores than the control group at all time points ($P < .05$).

Postpartum Depression

As depicted in Figure 2, in the control group, the EPDS score of parturients at the 6th week postpartum was 8.11 ± 1.84 (20 cases with a EPDS score over 9), while in the study group, the EPDS score at the 6th week postpartum was 5.23 ± 1.07 (0 cases with a EPDS score over 9). The study group exhibited significantly lower EPDS scores than the control group ($P < .05$).

Physiological Recovery

As illustrated in Table 2, the physiological recovery of postpartum parturients in the study group was superior to that in the control group ($P < .05$).

Quality of Life

As shown in Figure 3, in the control group, the postoperative scores for physical functioning (65.26±6.61), role limitations due to physical health (64.39±5.36), emotional well-being (62.34±6.99), social functioning (60.11±4.56), and cognitive functioning (61.08±5.17) were observed. In the study group, the postoperative scores for physical functioning (80.14±5.69), role limitations due to physical health (88.67±6.11), emotional well-being (87.96±8.37), social functioning (79.14±5.63), and cognitive functioning (72.69±6.33) were observed. The SF-36 scores of the study group's postpartum parturients were higher than those of the control group ($P < .05$).

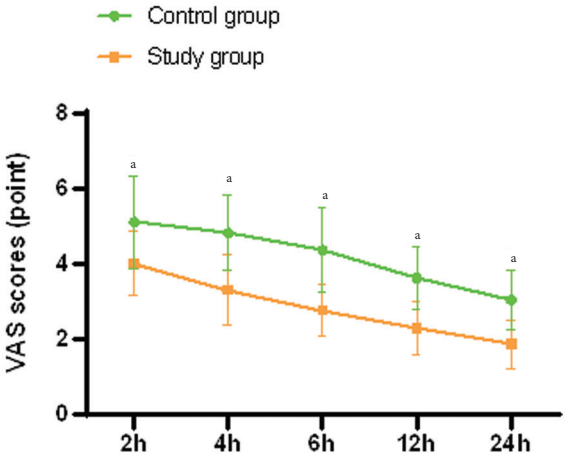
Clinical Significance

Lower VAS scores in the study group suggest more effective pain relief for postpartum women, translating to a potentially more comfortable and less distressing recovery period. This improvement in pain management not only contributes to the physical well-being of the mothers but also positively influences their overall postoperative experience. Additionally, lower EPDS scores in the study group signify a reduced level of postpartum depression compared to the control group. This is of paramount importance as it indicates that the combination of esketamine and comprehensive nursing intervention may have a protective effect against postpartum depression. Lower depression scores are associated with better mental health outcomes, potentially contributing

Table 1. Comparison of Baseline Characteristics between the Two Groups of Parturients.

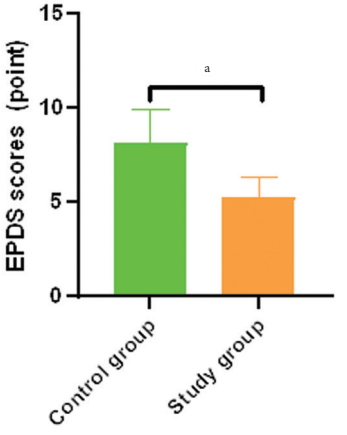
		Control group	Study group	*t*	*P* value
Number of Cases		70	70	-	-
Age (years)		24-28	23-30	-	-
	Mean	25.41±2.77	25.87±2.65	0.237	.794
BMI (kg/m²)	-	26.11±3.08	25.99±3.14	0.162	.884
Gestational week (weeks)	-	38.07±2.94	37.96±2.89	0.226	.813
ASA	I	45	48	-	-
	II	25	22	-	-
Parity	1	51	49	-	-
	2	18	21	-	-
	3	1	0	-	-

Figure 1. Changes in VAS Scores of Parturients in the Two Groups Postoperatively.



[a]indicates a statistically significant difference between the two groups, $P < .05$.

Figure 2. Comparison of EPDS Scores in Postpartum Parturients of the Two Groups.

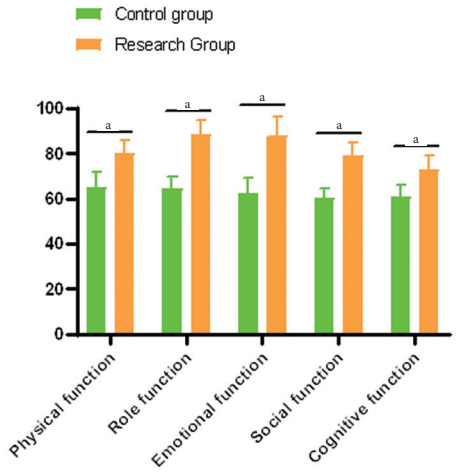


[a]indicates a statistically significant difference between the two groups, $P < .05$.

Table 2. Comparison of Physiological Recovery Indicators in Postpartum Parturients of the Two Groups.

	Control group	Research Group	*t*	*P* value
Number of Cases	70	70	-	-
First postoperative flatulence time (h)	42.51±5.68	34.55±2.99	11.225	<.001
First time out of bed (h)	50.71±8.94	41.25±3.14	13.256	<.001
Length of hospital stay (d)	9.17±2.36	6.25±0.89	8.941	.002

Figure 3. Comparison of SF-36 Scores in Postpartum Parturients of the Two Groups After Surgery.



[a]indicates a statistically significant difference between the two groups, $P < .05$.

to improved emotional well-being and a smoother transition to motherhood. In summary, the clinical significance of these findings lies in the potential enhancement of both physical and mental well-being for postpartum women undergoing cesarean sections. The combined approach of esketamine and comprehensive nursing intervention appears promising in alleviating pain, managing depression, and improving the overall postoperative experience for these women.

DISCUSSION

Previous research findings indicate that approximately 20% of postpartum women suffer from depressive symptoms, including feelings of sadness, anxiety, and even restlessness. Difficulties in concentration may also accompany these symptoms. Such symptoms can have adverse effects on the mother, the infant, and the family as a whole. Cesarean section surgery places high demands on anesthesia.[9,10] The chosen anesthetic agents must not only have no negative impact on the mother and infant but also need to act rapidly and provide potent pain relief. The technique of epidural anesthesia is relatively straightforward and allows precise control over the duration of anesthesia. Adjusting the duration of anesthesia based on the length of the cesarean section surgery can minimize the impact on the circulatory system.[11,12]

Ketamine's pharmacological potency is twice that of amantadine. It mainly affects NMDA receptors and exhibits a triple action of analgesia, sedation, and antidepressant effects. As an NMDAR antagonist, it non-competitively inhibits glutamate activation of NMDAR, thus alleviating the transferable and direct somatic pain caused by NMDAR-related injury, demonstrating strong analgesic effects.[13,14] Ketamine features rapid onset, potent analgesic and sedative effects, swift drug clearance, and minimal adverse reactions. It is widely used for analgesia and anesthesia in short-term examinations and clinical surgeries, displaying significant effectiveness.

Additionally, given that cesarean section is a common mode of delivery, it plays a major therapeutic role in managing difficult deliveries and certain obstetric complications. However, various postoperative complications might arise, such as wound healing issues, endometriosis, late postpartum hemorrhage, and uterine infections, all of which can diminish postoperative quality of life. Furthermore, postpartum women usually face various stressors following delivery, making them susceptible to complications like incisional pain, lactation problems, and emotional disturbances, all of which can significantly impact their recovery. Consequently, enhancing recovery outcomes after cesarean section and reducing the postpartum recovery time becomes a significant concern in obstetrics research.

Currently, comprehensive nursing intervention models are becoming increasingly widespread and in-depth in the field of obstetrics. A comprehensive nursing assessment can identify potential issues within the nursing process, and targeted measures can be taken to provide high-quality nursing care to patients. This aids in improving the quality of obstetric nursing and enhancing nursing outcomes.[15,16]

The purpose of this study was to investigate the impact of ketamine combined with comprehensive nursing intervention on postoperative pain, postpartum depression, and quality of life in women undergoing cesarean section. Through comparative analysis, it can be inferred that ketamine combined with comprehensive nursing intervention holds significant advantages in postoperative pain management following cesarean section. Compared to traditional nursing methods, the study group of women experienced better postoperative pain relief and a noticeable reduction in pain perception. Ketamine's analgesic effect may be attributed to its role as an N-methyl-D-aspartate receptor antagonist, inhibiting pain signal transmission.[17,18] The additional, comprehensive nursing intervention enhanced analgesic effects by alleviating postoperative discomfort through emotional support, rehabilitation guidance, and other means. The study results also indicated that ketamine combined with comprehensive nursing intervention helped alleviate postpartum depressive symptoms. Nursing professionals reduced emotional fluctuations in mothers through psychological support, education, and similar strategies, strengthening their psychological adaptation. Furthermore, ketamine's effects on the neurotransmitter system might positively influence emotional stability,[19,20] presenting a clinically significant finding for improving the psychological well-being of postpartum women.

Lastly, comprehensive nursing intervention significantly improved the quality of life for postpartum women. Through postoperative recovery guidance, dietary recommendations, breastfeeding support, and other methods, the women's lifestyle improved across various aspects, including physical, role, emotional, social, and cognitive functions. The combined analgesic effect of ketamine and the comprehensive nursing intervention provided robust support for the recovery and quality of life of postpartum women. These findings are consistent with similar results from previous studies, mutually reinforcing each other.

The results of this study underscore the positive impact of ketamine combined with comprehensive nursing intervention on women undergoing cesarean sections. This intervention strategy holds promise as an important tool in clinical practice to help women navigate the recovery period post-surgery more effectively. By enhancing pain relief, alleviating depressive symptoms, and improving quality of life, women can better adapt to their new life circumstances while contributing to their newborns' healthy growth.

The observed lower VAS scores in the study group, compared to the control group, are clinically significant. A lower VAS score indicates a reduced perception of pain, suggesting that the esketamine and comprehensive nursing intervention effectively manage postoperative pain. From a patient comfort perspective, this translates to a more tolerable and comfortable postoperative recovery experience. Clinically, these findings support the potential of incorporating esketamine into post-cesarean pain management protocols, alongside comprehensive nursing care, to enhance patient comfort and potentially improve recovery outcomes.

The lower EPDS scores in the study group carry important implications for postpartum depression management. A lower EPDS score suggests a reduced risk or severity of postpartum depression. This finding is particularly significant given the prevalence and impact of postpartum depression on new mothers, their infants, and families. It indicates that the combination of esketamine and comprehensive nursing intervention may play a role in not only physical recovery but also in supporting mental health post-cesarean section. These results highlight the importance of addressing physical and psychological needs in postoperative care. They may prompt a re-evaluation of current postpartum depression management strategies to include such multifaceted approaches.

The improvements in SF-36 scores in the study group indicate a holistic enhancement in the quality of life for postpartum women. This means that the women in this group were likely better equipped to handle the physical demands of new motherhood, experienced improved mental health, and were more capable of engaging in social and family life.

Clinical Significance

The observed lower VAS scores in the study group suggest more effective pain relief for postpartum women, contributing to a potentially more comfortable recovery. This improvement is clinically significant, enhancing the overall postoperative experience and potentially reducing the need for conventional analgesics. Similarly, the lower EPDS scores indicate a reduced risk of postpartum depression, emphasizing the potential of esketamine and comprehensive nursing intervention to positively impact mental well-being. In practical terms, these findings highlight the promise of this combined approach in promoting better outcomes for women undergoing cesarean sections, both physically and emotionally. This integrated strategy could inform and reshape clinical practices, leading to more personalized and effective care for postpartum women in the future.

Despite the encouraging outcomes of this study, it is imperative to engage in a forthright discussion regarding its inherent limitations, acknowledging the complexities that may have influenced the interpretation of our findings. First and foremost, the study's reliance on a sample size of 140 parturients, while sufficient for initial insights, invites scrutiny concerning the broad applicability of our conclusions. The potential diversity in physiological and psychological responses within a larger and more varied population necessitates caution in extending our findings to a broader demographic. Future investigations could benefit from an expanded sample size, fostering more stable and representative results that better encapsulate the multifaceted nature of postoperative experiences.

A critical facet of our study's limitations pertains to the temporal constraints imposed by the focus on the immediate postoperative period. This deliberate confinement restricts our purview into the enduring effects of esketamine and comprehensive nursing interventions, particularly in relation to postpartum depression and quality of life. As dynamic phenomena evolve over time, these aspects demand protracted observation to unravel the intricacies of their trajectories. Prolonging the follow-up period in subsequent studies becomes imperative to provide a more nuanced understanding of the sustained benefits and potential fluctuations in postpartum well-being, addressing the temporal dynamics that elude the immediate postoperative gaze.

Furthermore, transparency compels us to consider potential sources of bias or confounding variables that may have subtly influenced the study's outcomes. While efforts were made to minimize selection bias through randomization, inherent individual differences and unforeseen variables may have introduced nuances into the results. Rigorous exploration and acknowledgment of these potential confounders bolster the study's robustness and signal to future researchers the areas deserving heightened scrutiny.

Future research should aim to incorporate a multidisciplinary approach, potentially integrating neurobiological, psychological, and nursing science perspectives to unravel these mechanisms. Understanding the interplay between pharmacological effects and nursing care could lead to more tailored and effective postoperative strategies for women undergoing cesarean sections.

Encouraging a multidisciplinary approach in future research is pivotal to advancing our understanding of the mechanisms underlying the observed effects of interventions. Collaborative efforts across fields such as pharmacology, nursing science, and psychology could provide a holistic perspective on the complex interplay between pharmacological agents like esketamine and the nuances of nursing care. By integrating diverse expertise, researchers can unravel the intricate biological, psychological, and social factors contributing to postoperative outcomes in women undergoing cesarean sections. This interdisciplinary approach not only enhances our comprehension of intervention mechanisms but also lays the foundation for developing more targeted and personalized strategies that align

with the unique needs of individual patients, fostering more effective and patient-centered postoperative care.

In advocating for participant stratification in future research, it's essential to consider factors like age, pre-existing mental health conditions, and socio-cultural background. These elements play a pivotal role in shaping the postoperative experience of women undergoing cesarean sections. Stratifying based on age recognizes the distinct needs of different age groups, while considering mental health conditions ensures tailored support for those with specific concerns. Socio-cultural background influences pain perception and expectations from care. Acknowledging these individual differences allows for a more personalized and effective postoperative care approach, aligning with the goal of improving quality and patient-centeredness.

Considering the individual differences in response to medical and nursing interventions, future studies should aim to stratify participants based on relevant factors such as age, pre-existing mental health conditions, and socio-cultural background. This stratification could yield more nuanced insights and aid in personalizing postoperative care.

Long-term follow-up is imperative in future research to comprehensively assess the sustained impact of interventions on postpartum women. Postpartum depression, in particular, may exhibit delayed onset, necessitating extended observation periods to capture its evolving trajectory. Continuous monitoring enables a nuanced understanding of the persistence of depressive symptoms and the lasting effectiveness of interventions over time. In the context of esketamine and comprehensive nursing intervention, a prolonged follow-up would offer valuable insights into the durability of benefits, aiding in the formulation of more informed and enduring strategies for postoperative care in women undergoing cesarean sections.

In conclusion, based on the results of this study, future research could expand the sample size, extend observation periods, and delve deeper into the mechanisms and long-term effects of ketamine combined with comprehensive nursing intervention. Combining biological markers, neuroimaging techniques, and other tools can help further explore the influence of interventions on the physiological and psychological states of postpartum women, providing more comprehensive scientific support for clinical practice.

CONCLUSION

In summary, the results of this study demonstrate that ketamine combined with comprehensive nursing intervention has a positive impact on postoperative pain, postpartum depression, and quality of life in women undergoing cesarean sections. Our investigation unfolds with a resounding revelation - the amalgamation of ketamine and comprehensive nursing intervention exerts a positive influence on postoperative pain, postpartum depression, and the overall quality of life for women navigating the intricate journey of cesarean sections. For healthcare practitioners, our study offers actionable insights: (1) Integrated Care Approach: Advocate for an integrated care approach that incorporates ketamine into post-cesarean pain management protocols. This approach promises heightened pain relief and an improved postoperative experience. (2) Comprehensive Nursing Strategies: Embrace a comprehensive nursing care strategy, encompassing psychological support, education, and rehabilitation guidance. This holistic approach contributes significantly to the psychological well-being of postpartum women. (3) Routine Screening and Support: Routinely screen for postpartum depression, especially in the cesarean section population. Our findings suggest that the combined intervention may serve as a protective factor against postpartum depression. (4) Patient-Centric Recovery Plans: Tailor recovery plans based on individual needs and responses, recognizing the diverse experiences and challenges that postpartum women may encounter. Our study stands as a beacon of innovation by introducing a novel amalgamation of ketamine and comprehensive nursing care into the landscape of post-cesarean recovery. This integrative approach distinguishes our work, offering a nuanced and multifaceted strategy for optimizing maternal health. This finding holds significant clinical implications for enhancing the postoperative experience and psychological well-being of postpartum women and improving their overall quality of life. Future research can build upon the findings of this study by further investigating the mechanisms and long-term effects of the intervention, thereby providing more comprehensive guidance for clinical practice.

REFERENCES

1. Zhang F, Cheng J, Yan S, Wu H, Bai T. Early Feeding Behaviors and Breastfeeding Outcomes After Cesarean Section. *Breastfeed Med*. 2019;14(5):325-333. doi:10.1089/bfm.2018.0150
2. Carrapato MRG, Ferreira AM, Wataganara T. Cesarean section: the pediatricians' views. *J Matern Fetal Neonatal Med*. 2017;30(17):2081-2085. doi:10.1080/14767058.2016.1237496
3. Ma JH, Wang SY, Yu HY, et al. Prophylactic use of ketamine reduces postpartum depression in Chinese women undergoing cesarean section. *Psychiatry Res*. 2019;279:252-258. doi:10.1016/j.psychres.2019.03.026
4. Uldbjerg N, Hvidman L. [Cesarean section on maternal request]. *Ugeskr Laeger*. 2009;171(7):495.
5. Lee J, Son HK. Effects of simulation problem-based learning based on Peplau's Interpersonal Relationship Model for cesarean section maternity nursing on communication skills, communication attitudes and team efficacy. *Nurse Educ Today*. 2022;113:105373. doi:10.1016/j.nedt.2022.105373
6. Combellick JL, Telfer ML, Ibrahim BB, et al. Midwifery care during labor and birth in the United States. *Am J Obstet Gynecol*. 2023;228(5S):S983-S993. doi:10.1016/j.ajog.2022.09.044
7. Swainson J, Thomas RK, Archer S, et al. Esketamine for treatment resistant depression. *Expert Rev Neurother*. 2019;19(10):899-911. doi:10.1080/14737175.2019.1640604
8. Esketamine. In: *Drugs and Lactation Database (LactMed®)*. National Institute of Child Health and Human Development; 2006.
9. Forstholm MM, Lidegaard O. [Cesarean section on maternal request]. *Ugeskr Laeger*. 2009;171(7):497-502.
10. Lee YM, D'Alton ME. Cesarean delivery on maternal request: the impact on mother and newborn. *Clin Perinatol*. 2008;35(3):505-518, x. x. doi:10.1016/j.clp.2008.07.006
11. Grisbrook MA, Dewey D, Cuthbert C, et al. Associations among Caesarean Section Birth, Post-Traumatic Stress, and Postpartum Depression Symptoms. *Int J Environ Res Public Health*. 2022;19(8):4900. doi:10.3390/ijerph19084900
12. Sharpe EE, Arendt KW. Epidural Labor Analgesia and Maternal Fever. *Clin Obstet Gynecol*. 2017;60(2):365-374. doi:10.1097/GRF.0000000000000270
13. Nikayin S, Murphy E, Krystal JH, Wilkinson ST. Long-term safety of ketamine and esketamine in treatment of depression. *Expert Opin Drug Saf*. 2022;21(6):777-787. doi:10.1080/14740338.2022.2066651
14. Bozymski KM, Crouse EL, Titus-Lay EN, Ott CA, Nofziger JL, Kirkwood CK. Esketamine: A Novel Option for Treatment-Resistant Depression. *Ann Pharmacother*. 2020;54(6):567-576. doi:10.1177/1060028019892644
15. Sandall J, Tribe RM, Avery L, et al. Short-term and long-term effects of caesarean section on the health of women and children. *Lancet*. 2018;392(10155):1349-1357. doi:10.1016/S0140-6736(18)31930-5
16. Michaluk CA. Cesarean delivery by maternal request: what neonatal nurses need to know. *Neonatal Netw*. 2009;28(3):145-150. doi:10.1891/0730-0832.28.3.145
17. Qiu D, Wang XM, Yang JJ, et al. Effect of Intraoperative Esketamine Infusion on Postoperative Sleep Disturbance After Gynecological Laparoscopy: A Randomized Clinical Trial. *JAMA Netw Open*. 2022;5(12):e2244514. doi:10.1001/jamanetworkopen.2022.44514
18. Wang J, Huang J, Yang S, et al. Pharmacokinetics and Safety of Esketamine in Chinese Patients Undergoing Painless Gastroscopy in Comparison with Ketamine: A Randomized, Open-Label Clinical Study. *Drug Des Devel Ther*. 2019;13:4135-4144. doi:10.2147/DDDT.S224553
19. Wang T, Weng H, Zhou H, et al. Esketamine alleviates postoperative depression-like behavior through anti-inflammatory actions in mouse prefrontal cortex. *J Affect Disord*. 2022;307:97-107. doi:10.1016/j.jad.2022.03.072
20. Esketamine for treatment-resistant depression. *Drug Ther Bull*. 2020;58(12):183-188. doi:10.1136/dtb.2020.000043